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Characteristics of Farmer Cattle Feeding

Roy N. Van Arsdall
Kenneth E. Nelson

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Abstract

Fed cattle production grew by one-third during 1964-80. Meanwhile, the number of farmer cattle feeder operations fell by about half to only 113,000 as commercial feedlot enterprises effectively used capital, labor, and marketing to seize over 70 percent of the market. The drop in number of individual farmers who feed cattle should continue in the eighties. Overall, feedlots operated by farmers are becoming fewer but larger as numbers decline east of the Mississippi River, and as cattle feeders establish more farms in the western Corn Belt and southern High Plains.

Keywords: Cattle, cattle feeding, farmer cattle feeding, cattle facilities, cost of producing fed cattle, fed cattle.

Preface

This report is a part of a project by the National Economics Division (NED) that identifies the structural characteristics, operating practices, and costs of production for the major meat animal industries in the United States.

Chief contributors to this report are Richard J. Crom, Terry L. Crawford, C. Kerry Gee, Henry C. Gilliam, Virden L. Harrison, Ronald D. Krenz, and Timothy C. Ulrich.

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Summary

Farmer cattle feeders, their numbers declining steadily since the midsixties, produced about 28 percent of U.S. fed beef in 1980 (down from 61 percent in the 23 major cattle feeding States in 1964), as commercial feedlot enterprises effectively used capital, labor, and marketing to seize more than 70 percent of the market. Although individual operations increased in size, only 113,000 farmers fed cattle in 1980, down from 219,000 in 1964. Total fed cattle production rose 32 percent between 1964-67 and 1977-80, but farmer fed cattle output fell 32 percent.

Most of the farmer cattle feeders operated general crop-livestock farms in the North-Central region. However, farmer cattle feeding was edging westward to the western Corn Belt, western Iowa, the eastern sections of Nebraska and Kansas, and the southern High Plains. The shift was prompted largely by lower cost feeds and a drier climate that reduces the need for shelter and paved lots.

Farmer feeders grew grain crops, which accounted for three-fourths of crop output. Half of the grain was fed on their farms. Most farmers produced all the feed for their cattle. Farms where cattle were fed averaged 588 acres encompassing 81-percent cropland. Gross income per farm averaged $143,000 in 1980, of which 56 percent was livestock sales.

Auction markets furnished 36 percent of the cattle bought by farmer feeders. They finished steers to an average 1,168 pounds and heifers to 999 pounds; the smallest size feeders finished cattle to the greatest weights. Farmers sold 64 percent of their cattle directly to packers, 28 percent via terminal markets, and only 8 percent through auctions. Feedlot owners substantially underused their facilities in 1980, averaging a beginning inventory of only 61 percent of capacity; placements averaged 76 percent and sales 70 percent. Overall, sales averaged 129 head per farm, ranging from 45 cattle on farms with the smallest feedlots to 865 on those with the largest. Production dropped by half between 1975 and 1980 among farmers showing the lowest average sales; farmers making the largest sales increased output by half during the same period.

Only 18 percent of the total labor used by farmer cattle feeders was hired. Small feeders used four times the labor per head of cattle as used by larger feeders because of less mechanization, higher fixed labor requirements, and the longer feeding period in the smaller lots.

Seventeen percent of all farmer feeders counted cattle as their only livestock enterprise. Half raised one other kind of animal, and a third ran at least two additional livestock enterprises. The small feedlots tended to combine beef and dairy herds; half of all cattle feeding farms also produced hogs.

Most of the shortrun strengths of individual farmer cattle feeders are offset by fluctuating long-term features that eventually favor the commercial cattle feeder:

Strength: The farmer cattle feeder produces nearly all feedstuffs, reducing cash outflow for feed; grain crop silages also generate greater production per acre than only the grain harvest.

Weakness: Most feedstuffs produced for cattle are immediate cash crops, which, when sold, could stimulate cash flow.

Strength: Storing high-moisture grains eliminates the costly drying process; crop residue may be used for feed; substantial cropland exists for beneficial disposal of manure.

Weakness: Stored high-moisture grain loses the option of cash grain sales. Storage for all farm-produced feedstuffs must be provided, becoming a fixed cost.

Strength: Much of the work is done by the operator and unpaid family members; existing shelter buildings and feed storage facilities may be used to reduce operating costs.

Weakness: The farmer-run, diversified operation forces seasonal use of feedlot facilities, resulting in high fixed costs per animal fed, which contrasts with the year-round specialized efficiency of the commercial feedlot. At the same time, farmers' longrun, substantial investments in farm facilities, especially storage buildings, have not reached breakeven status.

Strength: Most feeder cattle needs are satisfied by local businesses, reducing transportation costs and stress of shipment.

Weakness: Infrequent buying and selling increases the risk of unfavorable price changes. Farmer feeders rarely use formal marketing strategies to reduce risks.

Definitions

Airtight upright silo: an upright cylindrical silo designed to prevent air from circulating with the ensiled feedstuffs.
Capacity of feedlot: the maximum number of cattle that can be fed in a feedlot at one time.
Cattle feeding: the feeding of cattle with grain and other feedstuffs to reach the market at a slaughter grade of Good or better.
Cold confinement barn: an open-sided shelter building in which cattle are confined without access to an outside lot.
Commercial feedlot: a feedlot with capacity for 1,000 or more head of cattle.
Country commission firm: a firm that represents the producer for a fee in negotiating sales of livestock on the farm to a packer.
Crop residue pasture: plant materials available for grazing after a crop has been harvested.
Diversion terrace: an earthen terrace designed to prevent runoff from precipitation from crossing feedlots and becoming contaminated with wastes from the feedlot.
Farmer feedlot: a feedlot with capacity for less than 1,000 head of cattle.
Feeder calf: an animal mature enough to be placed on feed but less than 1 year of age.
Feeder yearling: an animal to be placed on feed that is older than 1 but less than 2 years of age.
Feedlot: any place where cattle are fed, which may range from nothing more than a fenced area to housing for all cattle.
Fence line bunk feeder: a feeder to hold silages and/or concentrates, constructed as a part of the lot enclosure and serviced from outside of the lot.
Forward price: a cash contract providing for delivery of livestock at a future specified time with price and other terms of the trade established at the current time.
Front-end loader: a hydraulically operated implement mounted on the front of a tractor used for collecting and lifting materials, especially feedstuffs and manure in cattle feeding operations.
General partnership: a business organized as a partnership in which partners share in profits and losses.
Grade and yield (weight): a method of determining value of a slaughter animal based on quality and weight of the dressed carcass rather than live weight of the animal.
Grain crop silage: the whole plant of corn, grain sorghum, or other grain crops harvested at a moisture content high enough to allow fermentation and preservation in a silo.
Hay silage: any grass or legume crop, most commonly alfalfa, that is harvested at a moisture content high enough to allow fermentation and preservation in a silo.
Hedge on futures market: contracts sold in the futures market to offset the effect of price changes on the value of owned livestock.
Heifer: an immature female.
High-moisture grain: any grain containing enough moisture (usually 22 to 30 percent) to require the addition of preservatives or fermentation in a silo for storage.
Horizontal silo: any type of silo constructed horizontally on or below the surface of the ground.
Hormone-type materials: materials that provide the effects of a hormone and thereby act as growth stimulants.
Individual operation: a business organized under the direction of a sole proprietor.
Limited partnership: a business organized as a partnership in which one or more partners have limited liability and do not participate in management.
Liquid feedlot wastes: manure and other residues from cattle feeding containing enough water to be handled as a liquid.
Manure lagoon: a treatment structure for livestock wastes which can be aerobic, anaerobic, or facultative (capable of living in either of the other two environments), depending on loading and design.
Mechanical bunk feeder: a feeder to hold silages and/or concentrates, usually extending inside the lot or shelter barn, which is filled by electrically powered devices to move the feedstuffs.
Mobile grinder-mixer: a tractor-powered machine that both grinds and mixes feedstuffs and can be used to transport and deliver feeds to livestock feeders.
Nontillable pasture: forages for grazing produced on land that cannot be tilled for crop production.
Open front shed: a shelter building that has walls on the ends and one side with cattle free to go through an open side to an adjacent lot.
Open lot system: a feedlot that does not provide shelter buildings for the cattle.
Open upright silo: an upright cylindrical silo that has no provision for keeping air from circulating about the surface of the ensiled feedstuffs.
Order buyer: an agent who purchases livestock for a fee according to specifications of the buyer.
Portable bunk feeder: a feeder to hold silages and/or concentrates, which is usually placed in the lot with the cattle and can be moved with tractor power.
Regular auction market: a market facility that receives livestock from the seller and for a fee sells to buyers at an auction open to the public.
Roller mill: a feed mill, usually electrically powered, that mashes grains by passing them between rollers.
Rumensin: an antibiotic-like ingredient that results in improved feed efficiency by aiding microbial digestion in the rumen (brand name; other brands also available).
Settling basin: basin designed to settle out and retain most of the solid materials in runoff from a feedlot which it passes to a lagoon or vegetative filter. The solids must be removed periodically.

Skid loader: a self-propelled loader used for the same purposes as a front-end loader.

Small grain pasture: wheat or other small grain crops used for pasture in their early stage of growth.

Soil injection of wastes: injection of liquid wastes from cattle feeding below the surface of the soil to act as a fertilizer.

Solid feedlot wastes: manure and other residues from cattle feeding containing insufficient water to be handled as a liquid.

Standard "C" family corporation: a separately taxed entity in which equity ownership is represented by stock held by family members, and management is centralized and controlled by a board of directors.

Steer: a bull castrated before sexual maturity.

Subchapter "S" family corporation: similar to a "C" corporation except generally not separately taxed and subject to certain restrictions to maintain subchapter "S" status. It is taxed like a partnership.

Terminal market: a market facility generally located in or near a metropolitan area which receives livestock from the seller and sells them to packers through commission firms which represent the seller for a fee.

Vegetative filter: an area of close growing crops downslope from a feedlot designed to absorb pollutants in runoff after it has first moved through a settling basin to remove solid materials.

Warm confinement barn: a fully enclosed shelter building in which cattle are confined.

Waste management: the use or disposal of manure, used bedding, and waste water resulting from cattle feeding.

Characteristics of Farmer Cattle Feeding

Roy N. Van Arsdall
Kenneth E. Nelson*

Introduction

Farmers once accounted for all of the grain-fed beef cattle produced in the United States. Now farm feedlots produce little more than a fourth of the fed cattle; a few hundred large commercial feedlots produce the remainder. Fed cattle are still produced on more than 100,000 farms, which, along with the associated cattle feeding enterprises, continue to grow larger though fewer in number. The mix of resources available to these farms, practices used in feeding cattle on them, and changing economic conditions influence costs of production, the competitive position of farmer feeders, and potentially the supply of fed cattle. The outcome of these changing economic conditions and decisions related to them affects output, prices, and stability.

This report traces the development of cattle feeding in the United States and the shifting importance of farmer and commercial feeding. Detailed information is provided on farmer feeding of cattle, including the makeup of farms on which cattle are fed, the production and marketing practices used by farmer feeders, and the amounts and kinds of resources they use. Data provide a base for estimating costs of production.

Data Sources

Information in this report comes largely from a 1981 survey of farmer cattle feeders by the Statistical Reporting Service (SRS) and the Economic Research Service (ERS). The survey examines the makeup of farms with cattle feeding enterprises; the practices, facilities, and inputs involved in cattle feeding; and costs for which estimates are not available from other sources. Data collected apply to calendar year 1980.

The survey covered all or parts of five States (Illinois, Iowa, Minnesota, Kansas, and Nebraska) that accounted for 62 percent of the farmer feedlots and 72 percent of the cattle fed in farm feedlots in the 23 major cattle feeding States in 1980 (fig. 1). Producers were selected on a random basis and stratified according to size of enterprise from lists maintained by SRS. Farms were weighted according to their probability of selection in the sample so that results are representative of each size class. Data from each size class were then weighted according to the share of total fed cattle or number of feedlots represented so that aggregations for feedlots in all size classes reflected farmer cattle feeding in total.

Only producers who met certain qualifications were included in the sample to assure that the results would accurately represent farmer feedlot operations. Each producer in the sample fed cattle for the slaughter market during 1980, did not start or get out of the cattle feeding business during the year, sold at least 20 head of grain-fed cattle during the year, and had feedlot capacity for no more than 1,000 head at one time. Further, slaughter cattle had to account for at least 90 percent of all cattle sold from the operation during 1980.

The entry-exit constraint eliminated 1.4 percent of the producers (and potential respondents) who did not have a normal year of operation. The 1,000-head maximum capacity of feedlots excluded commercial feedlots. The 90-percent sales requirement eliminated operations which market both feeders and fat cattle, assuring that data would relate to cattle feeding and not other types of beef cattle production. Only 6.4 percent of the potential respondents were dropped because of such mixed sales of cattle. Forcing annual sales to be at least 20 head of fed cattle was by far the most important constraint on number of qualifying producers. According to 1978 census data, 44 percent of all operations selling fed cattle in the five survey States marketed fewer than 20 head annually. Their sales, however, accounted for only 2.5 percent of total sales of fed cattle in these States.

The population of producers qualifying for the sample was divided into four size classes based on annual sales of fed cattle matching census size classifications as follows: 20 to 99 head sold; 100 to 199 head sold; 200 to 499 head sold; and 500 or more head sold. The population of each size class was sampled randomly at a rate sufficient to provide approximately 50 farms in each of the four size classes. Complete information was collected for 188 farms.

The survey was designed specifically to obtain information that is not available from other sources on farmer cattle

*The authors are agricultural economists, Animal Products Branch, National Economics Division, Economic Research Service, U.S. Department of Agriculture.

feeding enterprises and the farms of which they are a part. To make this report as complete as possible, data from the Census of Agriculture, various SRS publications, and other secondary sources are used in addition to data from the survey. Estimates of costs and returns are produced annually in separate reports. (Budgets of costs and returns for farmer cattle feeding enterprises of different types and sizes are produced annually by the National Economics Division's Firm Enterprise Data System (FEDS) at Stillwater, Okla. Aggregate industry estimates of costs and returns are also prepared annually.) For methodology, procedures, and recent estimates of cost of feeding cattle, see *(8)*, *(15)*.[1]

Calendar year 1980 showed low returns to cattle feeding in the Corn Belt. In 1978, estimated returns based on feeding steers from 600 to 1,050 pounds with a 6-month lag between purchase of feeders and sale of slaughter cattle were positive for most of the year. Net margins climbed rapidly during the first part of 1979, reaching nearly $16 per hundredweight (cwt) in April, but fell sharply to below cost by August (fig. 2). Throughout the remainder of 1979 and much of 1980, margins remained negative by $5 to $10 per cwt, improving only slightly toward the end of 1980 *(12)*.

Losses from cattle feeding, incurred in late 1979 and during 1980, would have had no immediate effect on the basic characteristics of the farms on which cattle were fed in 1980 nor the major production practices and resources previously committed to cattle feeding. It is possible, however, that persistent, rather large losses may have influenced some factors measured in the survey, especially the purchases of feeder cattle and sales of slaughter cattle. The data reveal no apparent changes, but no assurance exists that the results would have been the same had 1980 and the preceding months shown positive returns to cattle feeding.

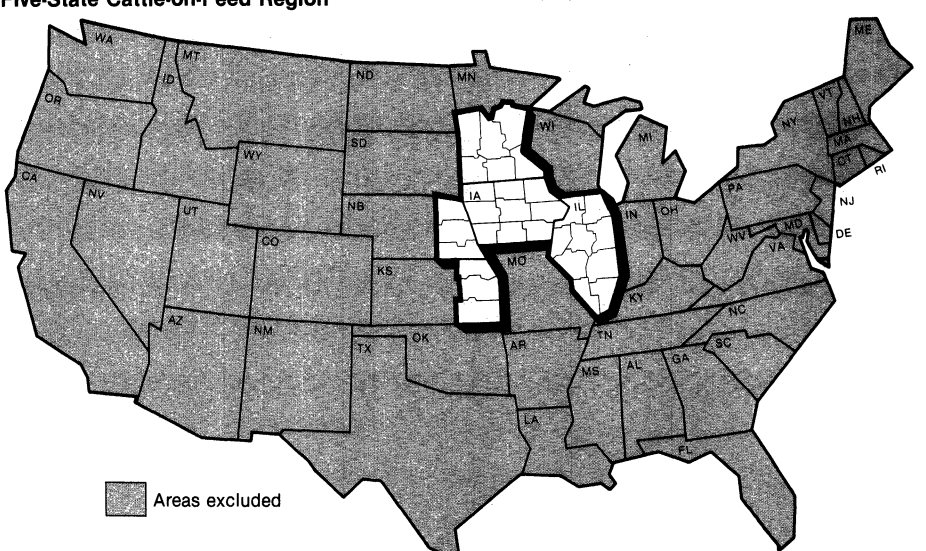
Feeding Cattle

Beef production involves two distinct phases which differ greatly in resources used, geographic location, size of enterprise, and product. Cattle raising is commonly thought

[1]Italicized numbers in parentheses are cited in the References section at the end of the report.

Figure 1

Five-State Cattle-on-Feed Region



of as the maintenance of brood cows and production of calves, but also includes the growing of cattle on forages in the same or separate operations (*1*). Cattle feeding is defined as the feeding of concentrates to cattle to attain a slaughter grade of at least Good by the time the cattle reach normal slaughter weights. Cattle raising and cattle feeding are not combined into one business to any extent except on general crop-livestock farming operations that include both beef cow herds and cattle feedlots.

Cattle feeding in this country spans over 100 years, but the industry did not reach its current large size until recently. Expansion occurred gradually until the late fifties, then increased rapidly through the sixties and early seventies because of abundant and low-cost grains, many advances in technology, and strong consumer demand (fig. 3 and app. table 1). In the early sixties, the 23 leading cattle feeding States were marketing 15 to 16 million head of fed cattle annually, which amounted to more than half of all cattle slaughtered commercially. Production of fed cattle continued to increase to a peak of about 27 million head in 1972, declined, then peaked again at about the same level in 1978. After 1972, however, annual production of fed cattle generally stayed in the 20-to 25-million-head range as a result of several factors, including much higher grain prices, which reduced returns from cattle feeding.

Some cattle are fed throughout the country, but the business is now concentrated in an area stretching from the western part of the Corn Belt and eastern Northern Plains through the High Plains of Texas and adjacent areas (fig. 4). Lesser concentrations still occur elsewhere in the country, but they account for a small part of total production.

Fed cattle marketed from the 23 major producing States averaged nearly a third greater in 1977-80 than during 1964-67. Changes in production, however, differed greatly among these States over this period. The increase in production was more than accounted for in the present areas of heaviest concentration (table 1). Texas more than tripled production between the two periods. Other Plains States recorded smaller, though substantial, gains. Most other States recorded reductions of 20 to 30 percent. As a whole, production in the Corn Belt/Lake States sagged 21 percent, and Arizona/California production plummeted 26 percent. Further, production of fed cattle has continued to shift into the areas of concentration from other areas of

Figure 2

Net Margins for Feeding Steers From 600 to 1050 Pounds, Corn Belt, 1979 and 1980

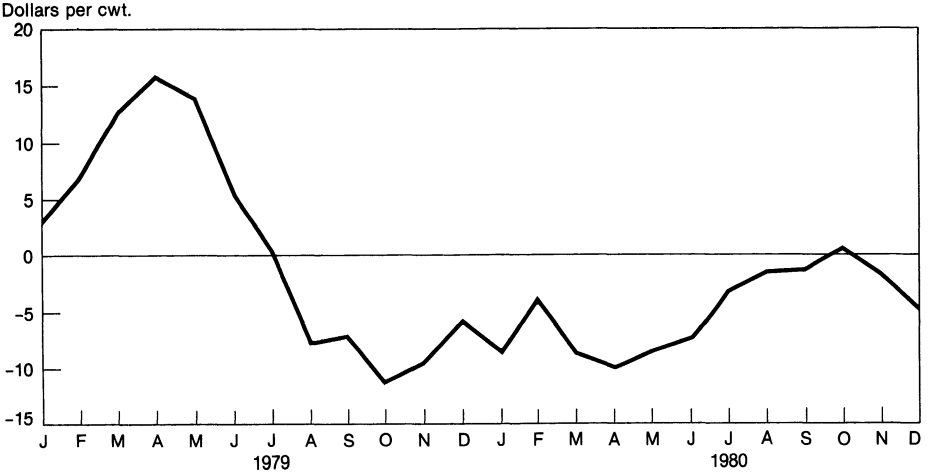


Figure 3

Production of Fed Cattle, by Type of Feedlot, 23 States, 1964-81

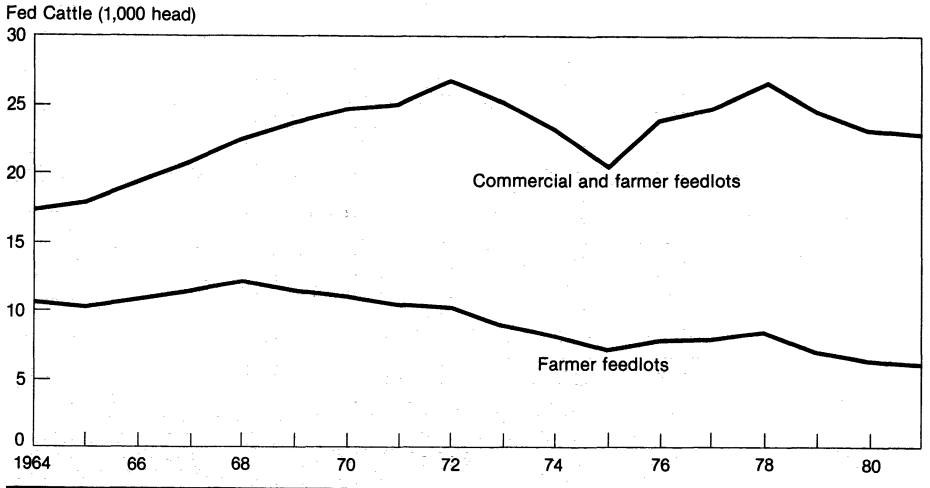
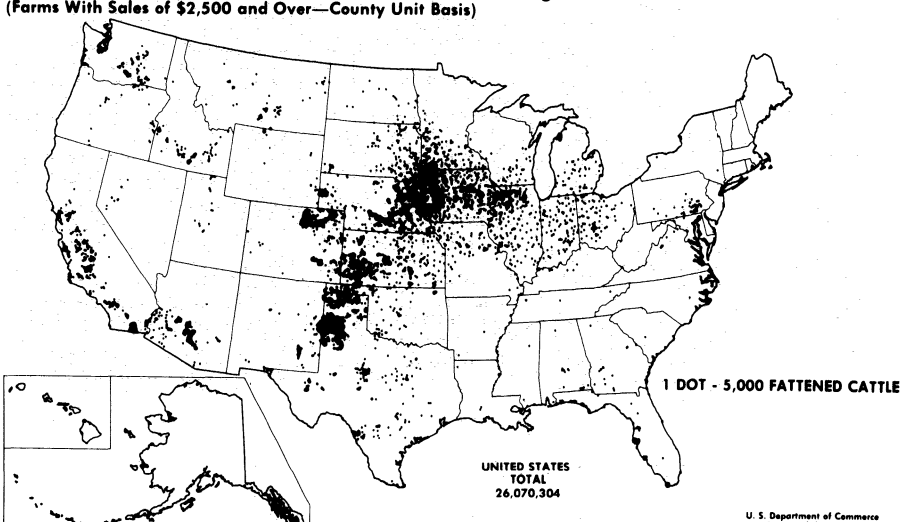


Figure 4

Cattle, Fattened on Grain Concentrates and Sold for Slaughter: 1974

(Farms With Sales of $2,500 and Over—County Unit Basis)



the States with expanding production, for example, into northwestern Iowa from other parts of the State.

The geographic shift and expansion of cattle feeding are closely associated with the growth of commercial cattle feeding. Small farm-based enterprises produced nearly all fed cattle only 40 years ago, primarily in the general crop-livestock farming areas of the North-Central States. Commercial feedlots began and continued their development in the present areas of concentrated cattle feeding largely because of advantages in climate and feed costs (*5*).

Farmer feeders still accounted for most of fed cattle production as recently as the midsixties. In 1964, over 219,000 farmer feeders sold 61 percent of all cattle fed in the top 23 States; 1,564 commercial feedlots turned out the remainder (app. table 1). Total production of fed cattle expanded, but both the number and share of production from farmer feedlots declined during subsequent years. By 1980, the number of farmer feedlots had dropped by nearly half, and their share of total production had fallen below 28 percent. Commercial feedlots numbered only 2,144, but annual sales averaged over 7,800 per feedlot, accounting for nearly three-fourths of all fed cattle.

Farmer cattle feeding has not only declined relative to commercial cattle feeding, but has decreased in absolute terms in the traditional farmer feeding areas and in States dominated by commercial feedlots (table 1). For example, in the Corn Belt/Lake States, farmer feeding dropped more sharply since the midsixties than did total production of fed cattle. In the Plains States, where total production more than doubled between the 1964-67 and 1977-80 periods, fed cattle from farmer feedlots dropped to 81 percent of the midsixties level.

General Farm Characteristics

In this analysis, all cattle feeding enterprises with a feedlot capacity of less than 1,000 head are considered farmer feedlots. Such feedlots could be single enterprise operations, as are most commercial feedlots, but most are part of multiple enterprise crop and livestock farm businesses. Therefore, the farm business setting in which

Table 1—Average annual marketings of fed cattle from all feedlots and farmer feedlots, selected States, 1964-67 and 1977-80

State	Average annual marketings of all fed cattle			Average annual marketings of farmer fed cattle		
	1964-67	1977-80	Change	1964-67	1977-80	Change
	-----1,000 head-----		*Percent*	*-----1,000 head-----*		*Percent*
Plains States	7,345	15,472	111	3,127	2,530	-19
Texas	1,283	4,437	246	131	83	-37
Kansas*	1,093	3,247	197	541	398	-26
Oklahoma	338	721	113	96	25	-74
Colorado	1,170	2,226	90	303	136	-55
New Mexico	198	326	65	12	[1]	-100
Nebraska*	2,680	3,939	47	1,545	1,506	-3
South Dakota	583	576	-1	499	382	-23
Southwest	2,765	2,035	-26	50	8	-84
Arizona	612	625	2	12	1	-92
California	2,153	1,410	-35	38	7	-82
Corn Belt-Lake States	7,602	5,975	-21	7,092	4,714	-34
Michigan	224	246	10	216	173	-20
Minnesota*	757	743	-2	700	670	-4
Wisconsin	191	180	-6	183	152	-17
Iowa*	3,532	2,921	-17	3,353	2,092	-38
Indiana	466	365	-22	421	320	-24
Ohio	450	332	-26	426	284	-33
Illinois*	1,323	930	-30	1,210	806	-33
Missouri	659	258	-61	583	217	-63
23 States	18,942	24,820	31	10,823	7,467	-31

*States included wholly or partly in the 1981 survey.
[1]None recorded.

these fed cattle are produced has a bearing on the way cattle are handled and how producers respond to varying conditions. Important farm characteristics include the enterprise mixes, sources of farm income, size and relative importance of the feedlot enterprise, the amount of farmland associated with the operation, tenure status of the producer, and the form of business organization.

Size of Feedlot Enterprise

The survey excluded farms selling fewer than 20 fed cattle in 1980 and those with feedlots with a capacity for 1,000 or more cattle. Within these size constraints, over 35,000 farms marketed about 4.5 million fed cattle in the five-State area in 1980 (table 2). According to the 1978 Census of Agriculture, farms selling fewer than 20 fed cattle accounted for 44 percent of all farms selling fed cattle that year but only 2.5 percent of total sales (app. table 2). Commercial feedlots dominated total production in Kansas and Nebraska, but these two States still showed substantial production from farmer feedlots.

Table 2—Distribution of farmer feedlots and sales of fed cattle, five survey States, 1980[1]

Feedlot annual sales (head)	Feedlots		Sales	
	Number	*Percent*	*1,000 head*	*Percent*
20 to 99	23,357	66.5	1,049	23.1
100 to 199	5,754	16.4	772	17.0
200 to 499	4,367	12.5	1,303	28.8
500 & over	1,631	4.6	1,410	31.1
All sizes	35,109	100.0	4,534	100.0

[1]States included in the survey were Illinois, Iowa, Minnesota, Kansas, and Nebraska.

Source: Estimates are based on a combination of data from the 1978 Census of Agriculture, changes in the number and size distribution between 1978 and 1980, and the 1981 survey (app. table 2).

Sales of fed cattle, the primary measure of enterprise size used in this study, averaged 129 head per farm (table 3). Farms with the smallest feedlots, which accounted for two-thirds of all feedlots and nearly a fourth of total sales, sold an average of 45 head. Those with the largest feedlots, while accounting for less than 5 percent of all feedlots, had average sales of 865 fed cattle and nearly a third of total sales.

The average size of all feedlots combined, as measured by sales of fed cattle, remained essentially the same in 1980 as in 1975 (app. table 3). Changes within the size classes, however, were substantial. Four percent of the farmers in each size class in 1980 had fed no cattle in 1975.[2] Farmers who fed cattle both years reduced production by nearly half between 1975 and 1980 in the smallest size class, but increased production by half in the largest size class. Substantial variation in both direction and scope of change took place in each size class in 1980. Production was cut more than half by 14 percent of the producers, and more than doubled for 11 percent. The enterprises that were the smallest in 1980 reflected production declines between 1975-80; the largest operations expanded.

[2]Reasons for feeding cattle on the farm in 1980 but not in 1975 are not known but could include construction of new feedlot facilities, reactivation of existing facilities, or the acquisition of a farm including cattle feeding. The sample included only farmers active in cattle feeding in 1980, so those feeding cattle in 1975 but not in 1980 can be evaluated only in terms of the 18-percent decline between 1975 and 1980 in number of feedlots with capacity for fewer than 1,000 head of cattle.

Table 3—Average feedlot capacity, annual sales, and indicators of the degree of feedlot use, 1980

Feedlot annual sales (head)	Average feedlot capacity[2]	Average sales in 1980[2]	Use relative to feedlot capacity in 1980[1]		
			Inventory Jan. 1, 1980[2]	Placements during 1980[3]	Sales during 1980[3]
	Head		*Percent*		
20 to 99	113	45	45	49	40
100 to 199	201	134	60	77	67
200 to 499	359	298	72	87	83
500 & over	701	865	83	123	123
All sizes	185	129	61	76	70

[1]Each measure of use divided by feedlot capacity.

[2]Based on all feedlots in the survey.

[3]Six percent of the feedlots in the survey changed feedlot capacity during 1980. These feedlots were excluded from the estimates of rate of use of feedlot capacity.

Changes in the size of cattle feeding enterprises between 1975 and 1980 mirrored changes in the size of farms (app. table 4). Farmers who owned more land in 1980 than in 1975 generally increased cattle feeding the most; those with less land generally fed fewer cattle. The capacity for the production of feed is likely the major reason for such parallel changes in the amount of land and number of cattle fed.

Feedlot capacity, measured by the producer's estimate of the number of cattle that can be handled at one time, indicates potential production. Capacity is, therefore, an important indicator of size of enterprise, and when related to annual sales, gives an approximate indication of the degree to which facility investments are used.

All cattle feeders vary the use of their feedlots according to expected profitability, weather, supply of feeder cattle, and other factors. Farmer feeders commonly vary the number of cattle on feed depending on the labor requirements of other farm enterprises. As a result, farmer feeders typically operate well below the capacities of their feedlots.

Potentially, producers could achieve annual sales of fed cattle at least equal to the capacity of their facilities because extended feeding programs for calves seldom require more than 12 months. Annual sales or the turnover rate could average close to twice the feedlot capacities (2). About two-thirds of all cattle fed by farmer feeders in 1980 were yearling or older cattle which normally require 6 months or less from placement to slaughter weight, depending upon weights and feeding programs.

All measures of feedlot use showed that producers operated far below the capacity of their facilities during 1980 (table 3). The smallest enterprises had feedlots less than half full at the beginning of the year, and both placements and sales remained below 50 percent of capacity during the year. The turnover rate and other measures of use were higher for the larger feedlots, partly because a greater proportion of the placements were yearling or older cattle but mostly because the commitment to cattle feeding increased in direct proportion to size of the cattle feeding enterprise.

Land and Land Use

The amount of land farmed and crops produced are crucial factors in farmer cattle feeding operations because virtually all feeds fed to cattle are produced on the farm rather than purchased. Farms where cattle are fed contained relatively large amounts of land, mostly cropland (table 4). The average size of all farms was 588 acres, showing 81-percent cropland. The larger cattle feeding enterprises operated on farms with the most land.

Farmers operated more land on the average in 1980 than in 1975 regardless of size of the cattle feeding enterprise. Land farmed by the large cattle feeders increased 14 percent (app. table 5). Only 15 percent of all farms had less land in 1980 than in 1975.

Owner-operated units accounted for 26 percent of all farms, part-owned farms 68 percent, and tenant-operated farms 6 percent. Part-owned farms had the largest acreage and owner-operated farms the smallest.

Cropland was devoted mostly to production of the major cash and feed crops common in the area. Nearly all producers raised corn for grain, silage, or both. Soybeans were grown on 67 percent of the farms, alfalfa on 65 percent, oats on 41 percent, and wheat on 29 percent. All other crops were produced on no more than 7 percent of the farms.

Corn and soybeans dominated the crop mix, accounting for 77 percent of the acreage of all crops (table 5). Corn was

Table 4—Average amount of land per farm with feedlot, 1980

Feedlot annual sales (head)	Acres per farm							
	All farms		Owner operated		Part owned		Rented	
	All land	Cropland	All land	Cropland	All land	Cropland	All land	Cropland
	Acres							
20 to 99	548	443	401	308	603	495	519	395
100 to 199	546	446	388	297	621	525	551	367
200 to 499	765	635	563	460	908	750	363	340
500 & over	839	697	567	512	913	747	862	739
All sizes	588	479	424	331	658	543	495	384

grown on an average of 241 acres per farm, and soybeans on 101 acres. Producers grew alfalfa on an average of 34 acres followed by wheat, grain sorghum, and oats on smaller acreages. All other crops combined averaged only 6 acres per farm, or slightly more than 1 percent of the total.

Soybeans and wheat were essentially all sold as cash crops. More than half of all other major crops was fed to livestock on the farm. Farms with the largest feedlots generally fed the highest proportion of their crops. Size of the feedlot enterprise, however, did not correlate closely with the proportion of crops fed. Other livestock enterprises, particularly hogs, dairy, and beef cows, were important feeders of farm-grown crops, especially on farms with the smaller cattle feeding enterprises.

Other Livestock Enterprises

Farmer cattle feeders typically had other livestock enterprises in 1980 (table 6). Only 17 percent fed solely cattle. More than half of the farmers with the largest feedlots produced livestock other than fed cattle.

About half of all farmers had only one other livestock enterprise besides cattle feeding. Usually, hogs were the second enterprise, especially when combined with the larger feedlots. Beef cows and dairy were the major second enterprises on farms with the smallest feedlots.

Over one-third of all farmers who fed cattle operated at least two more livestock enterprises. By far, the most common combination was beef cows and hogs, which were raised on nearly a fourth of all farms. Hogs, either exclusively or in combination with other livestock enterprises, were raised on 55 percent of all farms with cattle feedlots; beef cow enterprises were carried on 46 percent of all farms.

The crop and livestock enterprises on these farms in 1980 reflect substantial diversification, yet in terms of livestock production, farmers have moved gradually toward specialization since 1975. Between 1975 and 1980, the proportion of farms with cattle feeding as the only livestock enterprise increased from 12 to 17 percent (app. table 6). A smaller proportion of the 1980 farms had hog, beef cow, and dairy enterprises in 1980 compared with 1975. Ten percent of the farms dropped beef cow enterprises that had been active in 1975; 8 percent dropped hog enterprises (app. table 7). Further, enterprises that were operated in both 1975 and 1980 were seldom reduced in size (app. table 9). Enlargement occurred in 94 percent of the dairy operations, 56 percent of the beef cow herds, and 34 percent of the hog enterprises. The size of these enterprises remained unchanged between 1975 and 1980 on most other farms.

Table 5—Average acreage of selected crops produced per farm and the proportion fed to livestock on farms with cattle feeding enterprises, 1980

	Annual sales of fed cattle (head)									
	20 to 99		100 to 199		200 to 499		500 & over		All sizes	
Crop[1]	Acres	Fed	Acres	Fed	Acres	Fed	Acres	Fed	Acres	Fed
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Corn, grain	190	50	208	61	315	57	339	80	216	55
Corn, silage	17	100	16	100	46	100	114	100	25	100
Soybeans	81	0	136	0	159	7	100	0	101	1
Alfalfa	31	80	24	97	57	76	56	77	34	83
Wheat	28	0	19	3	23	2	21	4	26	1
Grain sorghum	25	66	6	100	8	19	14	91	19	66
Oats	17	51	19	69	17	78	18	98	17	71
All other	7	[2]	4	[2]	3	[2]	6	[2]	6	[2]
Total	396	[2]	432	[2]	628	[2]	668	[2]	444	[2]

[1]Producers listed a maximum of their five most important crops, including acreages double cropped, such as soybeans after small grain. The total acreage of crops identified, therefore, is not precisely equal to cropland available. The proportion of production fed pertains to use by all livestock on the farm regardless of kind.

[2]Not estimated.

Income Sources

The considerable diversification of enterprises on farms that fed cattle in 1980 is borne out by estimates of the proportion of gross income derived from various crop and livestock enterprises (table 7). The average for all farms showed gross income divided nearly evenly between crops (44 percent) and livestock (56 percent). Corn and soybeans accounted for most of the income from crops. Fed cattle and hogs generated most of the income from livestock, followed by both dairy and beef cow enterprises. Gross income per farm averaged $143,000. Off-farm income was not measured in this study, but other studies have indicated that its share of total income declined when farm size increased.

Gross income from the sale of crops fell just below half of the total for all farms except those where 500 or more fed cattle were sold. For these larger producers, crops accounted for only a sixth of the total. Corn and soybeans produced the most crop income regardless of the size of the cattle feeding enterprise.

Sources of gross income from livestock enterprises varied greatly among farms. Fed cattle accounted for only 5 percent of gross income on farms with the smallest feedlot enterprises. Hog, dairy, and beef cow enterprises all produced more gross income than feedlots, which often get many or all of their feeder animals from beef cow or dairy herds on the same farm.

Cattle feeding earned 69 percent of the livestock sector's gross income on farms that sold 500 or more fed cattle. Dairying was associated with cattle feeding only on farms with the smallest cattle feeding enterprises, but hogs contributed significantly to gross farm income even for the group of farms with the largest sales of fed cattle. The major reason for hog and cattle feeding combinations is probably diversification; hogs following cattle to scavenge feed is no longer a common practice.

Farm Business Organization

Over 80 percent of all farms feeding cattle in 1980 were organized under the direction of a sole proprietor (table 8) (*2*). Full partnerships, most commonly composed of family members, accounted for much of the remainder. Limited partnerships and family corporations combined constituted only 4 percent of the total.

The corporate form of business organization was used more often by farmers with the larger cattle feeding enterprises. Overall, however, the relationship among the types of business organizations and farms with different sizes of cattle feeding enterprises was limited because size of feedlot enterprise was not a major indicator of size of farm business. Sales from the largest cattle feeding enterprises averaged nearly 20 times more than sales from the smallest. However, gross farm income for farms with the largest feedlots was less than three times that of farms with the smallest feedlots because of the effects of other farm enterprises. Less than 8 percent of all corporations were involved in nonfarm businesses.

Acquisition of Feeder Cattle

Farmer cattle feeders compete in the general market to acquire feeder cattle. Sources differ in two major ways from those of commercial feedlots. First, farmer cattle feeders produce some of their own feeder cattle, especially those who operate small feedlots. Beef cow enterprises produce the most home-raised feeder cattle, but calves from dairy enterprises also become feeders on some farms. Second, nearly half of the cattle fed in commercial feedlots are custom fed for outside cattle owners (*2*).

Table 6—Proportion of cattle feeding farms with various combinations of other livestock enterprises, 1980

Feedlot annual sales (head)	Kinds of other livestock[1]						
	None	Beef cows	Hogs	Dairy	Sheep	Beef cows and hogs	Other combinations of two or more
				Percent			
20 to 99	11	26	9	10	1	27	16
100 to 199	17	6	57	*	1	16	3
200 to 499	39	8	27	*	0	13	13
500 & over	49	6	32	0	0	8	5
All sizes	17	20	20	7	1	23	12

[1]Enterprises are listed as the only livestock enterprise in addition to cattle feeding or specified combinations of other livestock enterprises.
*Less than 0.5 percent.

Table 7—Sources of gross income on farms with cattle feeding enterprises, 1980

Farm enterprise	Annual sales of fed cattle (head)				
	20 to 99	100 to 199	200 to 499	500 & over	All sizes
			Percent		
Crops:[1]					
Corn	23	19	22	7	21
Soybeans	16	26	20	8	17
Wheat	4	3	2	1	3
Other crops	4	1	2	*	3
Total crops	47	49	46	16	44
Livestock:[2]					
Fed cattle	5	27	36	69	21
Beef cows	9	7	4	3	7
Hogs	19	17	14	12	17
Dairy	19	*	*	0	11
Other livestock	1	*	*	*	*
Total livestock	53	51	54	84	56
Total farm	100	100	100	100	100
			1,000 dollars		
	122	136	203	313	143

*Less than 0.5 percent.

[1]Gross income is from sales of crops at State average yields and prices for 1980. Respondents were limited to listing their five most important crops in 1980, so sales could have been larger to the extent that more than five crops were produced from which products were sold. The possible effect of this constraint is considered to be quite small. The value of crops fed to livestock is not included.

[2]Gross income is from livestock and livestock products sold, or the market value of livestock transferred from one enterprise to another, minus the cost of purchased feeder animals, or the market value of feeder animals transferred from one enterprise to another. For example, the cost of purchased feeder cattle is deducted from the receipts from the sale of fed cattle. Beef cow enterprises are credited with the market value of feeder animals produced and fed to slaughter weight on the same farm; receipts from sales of fed cattle are charged with the value of home-raised feeders.

Table 8—Proportion of cattle feeding farms having specified forms of business organization, 1980

Form of organization	Annual sales of fed cattle (head)				
	20 to 99	100 to 199	200 to 499	500 & over	All sizes
			Percent		
Individual operation	85.3	76.4	76.4	65.5	81.8
Partnerships:					
General partnership	14.3	13.5	13.9	15.5	14.1
Limited partnership	.2	5.4	4.1	2.4	1.7
Corporations:					
Standard "C" family	.2	4.7	3.2	8.9	1.7
Subchapter "S" family	*	0	2.4	7.5	.7
All other	0	0	0	.2	*
Total	100.0	100.0	100.0	100.0	100.0

*Less than 0.05 percent.

Custom feeding is rarely done by farmer feeders, so it is not considered further in this analysis. Home-raised and purchased feeder cattle account for essentially all of the cattle fed by farmer cattle feeders.

The average farmer feeder acquired 145 head of feeder cattle in 1980—84 percent through purchases and 16 percent from beef cow and dairy enterprises on the farm (table 9). Home-raised cattle were major sources of supply on farms with the smallest feedlots. Fifty-eight percent of these producers raised all of the cattle they fed, and another 18 percent raised part of them (table 10). Home-raised cattle were a small part of the supply on farms with the larger feedlots; purchased cattle accounted for 88 to 98 percent of the supply on farms with the larger feedlot enterprises.

Geographic Origin of Purchased Feeder Cattle

Cattle raising, while more important in some areas of the country than others, is conducted throughout the United States. Thus, some feeder cattle must be transported for long distances at substantial cost to reach areas of intensive cattle feeding.

Table 9—Sources of feeder cattle acquired by farmers, 1980

Feedlot annual sales (head)	Average number head acquired	Raised cattle	Purchased cattle
	Number	----- *Percent* -----	
20 to 99	60	41	59
100 to 199	156	12	88
200 to 499	311	6	94
500 & over	870	2	98
All sizes	145	16	84

Table 10—Proportion of farmers getting feeder cattle from selected sources, 1980

Feedlot annual sales (head)	Source of cattle		
	All raised by farmers	All purchased by farmers	Raised and purchased by farmers
		Percent	
20 to 99	58.0	24.0	18.0
100 to 199	4.1	71.9	24.0
200 to 499	3.4	73.1	23.5
500 & over	0	84.5	15.5
All sizes	38.9	41.5	19.6

Farmers usually have the opportunity to purchase feeder cattle without paying large transportation costs. In 1980, farmers with small feedlots bought cattle largely from locally raised feeder cattle operations. The farmers purchased 58 percent of their feeder cattle in their home State and the remainder from within the North-Central region (table 11). Farmers with the larger feedlots, however, started to buy from more distant areas. Farmers feeding 500 or more cattle during the year bought most of their cattle from within the North-Central region, but they drew some from many other areas of the country. Fewer than half of the producers with the largest feedlots bought cattle from one region only, 36 percent made purchases from two regions, and 17 percent dealt in cattle originating from three or more regions.

Description of Purchased Feeder Cattle

Purchased feeder cattle were identified according to sex, age, and weight, but not by breed or grade.

Purchases of feeder cattle averaged 117 head per farm, ranging from 28 head on farms with the smallest feedlot enterprises to 859 head on those with the largest. Steers accounted for 70 percent of total purchases, and heifers 30 percent (table 12). Steers constituted 86 percent of total purchases on farms with the smallest feedlots where they were often added to home-raised feeder cattle, and 65 percent on farms with the largest feedlots.

Producers also classified their purchased cattle as either calves or yearling cattle. Calves are animals less than 1 year old and are often placed on a growing ration, even on pasture for a period, before being placed on a finishing ration. Yearlings are older than 1 year and normally go on feed immediately after purchase. This was, in part, a subjective estimate of age based on weight of the cattle because exact age is often unknown by the purchaser. Purchased cattle are further categorized according to feeding programs and the approximate time from purchase to market.

Yearling steers accounted for about half of all purchased cattle, regardless of the cattle feeding enterprise size (table 12). Yearlings of both sexes accounted for 78 percent of all purchased cattle on farms with the largest feedlots, but only about half of the purchases on farms with the smaller feedlots. Operators of farms with the smaller feedlots likely emphasized purchasing calves because more forages were available for growing cattle, matching purchased with home-raised feeders, and feeding only one lot of cattle each year.

Average weights of purchased feeder cattle were 445 and 482 pounds for heifer and steer calves, respectively, and

607 and 672 pounds for yearling heifers and steers, respectively (table 13). Weights of the various kinds of cattle differed among farms with the four sizes of enterprises, but no consistent relationship existed between weight of feeder cattle and size of feedlot.

Farmers mixed the kind of cattle purchased. Thirty-seven percent of all producers bought only yearling steers, the dominant program regardless of the size of the cattle feeding enterprise (app. table 9). Purchases were largely a mixture of both sexes and ages of cattle. Calves of both sexes were bought by 17 percent of all farmers; steer calves only by 11 percent; mixed sex and age cattle by 10 percent; and the several other mixtures of cattle each accounted for less than 10 percent of all farms.

Seasonal Distribution of Purchases

Traditionally, farmer cattle feeders have purchased most of their feeder cattle during late fall and winter when requirements for labor from field operations were the least and the supply of cattle coming off pastures and ranges the greatest. In 1975, farmer cattle feeders bought 42 percent of their feeder cattle during the fourth quarter of the year, 61 percent from October through March, and the purchases during the second and third quarters divided nearly equally (2). Purchases had shifted somewhat from the fourth to the first quarter of the year in 1980, but the overall seasonal distribution of purchases was essentially unchanged (table 14).

Producers running the smallest feedlots exhibited the strongest concentration of seasonal purchases in 1980, buying 82 percent of all of their feeder cattle between October and March (table 14). Yearling purchases were concentrated in the fourth quarter of the calendar year, and calf purchases centered on the first quarter of the year. In each case, about 60 percent of the purchases were made during one peak quarter. In fact, 85 percent of the small cattle feeders bought feeder cattle only during one quarter of the year, subjecting themselves to greater price risk but fitting purchases to seasonal labor availability (table 15). Such purchases were also likely matched with home-raised feeder cattle which were an important part of the total supply on farms with the smallest feedlots.

Table 11—Proportion of feeder cattle purchased from various geographic sources, 1980

Feedlot annual sales (head)	Geographic region								
	Home State	North Central	Northeast	Southeast	Southwest	Mountain	West	Canada or Mexico	Unknown
	Percent								
20 to 99	58	42	0	0	0	0	0	0	0
100 to 199	25	60	0	6	3	*	2	0	4
200 to 499	20	64	1	5	2	8	0	0	0
500 & over	15	57	*	7	6	13	0	*	1
All sizes	26	57	1	5	3	7	*	*	1

*Less than 0.5 percent.

Table 12—Distribution of purchased feeder cattle, by kind of cattle, 1980

Feedlot annual sales (head)	Average number purchased (head)	Steers		Heifers	
		Calves	Yearlings	Calves	Yearlings
		Percent			
20 to 99	28	33	53	13	1
100 to 199	139	32	40	25	3
200 to 499	298	19	46	21	14
500 & over	859	15	51	7	27
All sizes	117	23	47	16	14

Nearly half of the farmers feeding 500 or more head annually bought cattle throughout the year, although most feeder cattle, especially calves, were bought during late fall and winter. Purchases of yearlings, which were the most important kind of feeder cattle in these larger operations, were spread rather evenly over the four quarters of the year. Seasonal buying and feeding of cattle likely will continue on farms where the cattle feeding enterprise is minor compared with crop production. Year-round purchasing and feeding of cattle, common in commercial feedlots, will dominate where cattle feeding is the major enterprise. The higher price risks accompanying one-time purchases of feeder cattle and feeding cattle for only part of the year, coupled with the higher cost of facilities per head marketed, are part of the weakness of small cattle feeding operations, leading to the long-term decline of number of farmer feeders.

Table 13—Average weight per head of purchased feeder cattle by kind of cattle, 1980

Feedlot annual sales (head)	Kind of cattle			
	Steer calves	Yearling steers	Heifer calves	Yearling heifers
	Pounds			
20 to 99	504	653	468	670
100 to 199	448	636	426	588
200 to 499	496	666	448	610
500 & over	486	705	458	598
All sizes	482	672	445	607

Table 14—Distribution of purchases of feeder cattle, by ages of cattle, quarters of the year, 1980

Feedlot annual sales (head)	Purchases per quarter			
	January-March	April-June	July-September	October-December
	Percent			
All cattle:				
20 to 99	41	8	10	41
100 to 199	20	16	32	32
200 to 499	27	17	15	41
500 & over	25	21	19	35
All sizes	28	16	19	37
Calves:				
20 to 99	60	4	17	19
100 to 199	31	11	26	32
200 to 499	40	9	4	47
500 & over	28	12	13	47
All sizes	39	9	15	37
Yearlings:				
20 to 99	25	9	5	57
100 to 199	5	23	40	32
200 to 499	18	22	23	37
500 & over	24	24	21	31
All sizes	21	21	21	37

Methods of Purchasing Feeder Cattle

Farmers who purchase only a small number of feeder cattle each year usually buy in person. In 1980, operators of the two smallest sizes of feedlots bought over half of their feeder cattle personally at an auction market; another one-fifth of feeder cattle were bought directly from the farm or ranch where the cattle were raised (table 16). Analysts have debated whether one-time purchasers of small numbers of feeder cattle can compete effectively with professional buyers. Some consider participation in auctions by such small-volume cattle feeders to be a wintertime social event which is not a cost to the farm business, true only when feeder cattle are purchased at a competitive price.

Operators of the larger feedlots bought a portion of their feeder cattle personally, but relied mostly on order buyers or commission firms to buy cattle for them. Seventy-one percent of all cattle were purchased by such agents for farms feeding 500 or more cattle in 1980. Though hired agents bought most of the feeder cattle, over a third of the larger volume producers used several methods of purchase (table 17).

Marketing of Slaughter Cattle

Farmers reported a variety of practices in slaughter cattle marketing, especially in choice of market outlets and methods for pricing cattle.

Table 15—Proportion of farmers purchasing feeder cattle in single versus multiple quarters of the year, 1980

Feedlot annual sales (head)	Farmers purchasing cattle			
	One quarter	Two quarters	Three quarters	Four quarters
	Percent			
20 to 99	85	6	0	9
100 to 199	36	44	17	3
200 to 499	43	36	7	14
500 & over	3	23	30	44
All sizes	57	24	8	11

Sales of Slaughter Cattle

Producers sold an average of 129 head of slaughter cattle per farm in 1980–45 from farms with the smallest feedlots and 865 from those with the largest feedlots (table 18). Two-thirds were steers, and a third were heifers. Steers accounted for a slightly higher proportion of total sales from the smaller feedlots compared with the larger ones.

Farmers continued the tendency to feed cattle to heavier weights than did commercial feedlot operators, which is traced to the feeding of only one or two groups of cattle a year and not having replacements scheduled immediately after slaughter cattle are ready for sale. Also, commercial feeders ordinarily have the minimum of the Choice grade as a goal while farmers are more likely to aim for average Choice. Historically, many farmers fed cattle to reach the Prime grade. In 1980, slaughter steers from farmer feedlots weighed an average of 1,168 pounds per head at sale; slaughter heifers weighed 999 pounds per head (table 19). Cattle from the smallest feedlots weighed the most with steers averaging 1,221 pounds and heifers 1,026 pounds.

Seasonal Distribution of Marketing

The mix of home-raised feeder cattle, timing of purchases and weights of purchased feeder cattle, and feeding programs resulted in a leveling of sales of slaughter cattle throughout 1980 almost identical to the seasonal pattern of marketing in 1975 (2). Quarterly sales from all farms were essentially the same during each quarter of the year (table 20). Sales of slaughter heifers were greatest during the first and fourth quarters of the year, but were counterbalanced by slightly larger sales of slaughter steers during the second and third quarters.

Differences in weights of purchased cattle, time on pasture, and content of rations eliminated the strong concentration of seasonal purchases as a factor in the seasonality of marketing of slaughter cattle, even for farms with the smallest feedlots. Operators of small feedlots sold most of their slaughter cattle during the third quarter of the year, but sales were 22 percent of total even during the second quarter when the fewest sales were recorded. Thus, while acquisitions of feeder cattle reflected a strong seasonal concentration, sales of slaughter cattle were spread rather evenly over the year regardless of size of enterprise.

Types of Markets

Farmers differed greatly in their choice of market outlets depending largely upon the number of slaughter cattle they had to sell in 1980. Overall, 64 percent of all slaughter cattle were sold to packers either directly or through country commission firms, 28 percent moved through terminal markets, and 8 percent were sold at auctions (table 21). Producers with the fewest cattle to sell used terminal and auction markets extensively. Most of them used one or the other of these markets as their only outlet (app. table 10). Those with the largest operations sold 81 percent of their cattle to packers directly and another 11 percent to packers through commission firms. They made little use of auction and terminal markets, and used multiple outlets apparently as a diversification procedure. The use of country commission firms was not related to volume of sales but rather to location and availability of the service.

Table 16—Proportion of feeder cattle purchased, by selected methods, 1980

Feedlot annual sales (head)	Methods of purchase		
	Cattle bought directly from farm or ranch	Cattle bought personally by farmer at auction	Cattle bought through order buyer or commission firm
	Percent		
20 to 99	19	54	27
100 to 199	3	55	42
200 to 499	12	27	59
500 & over	8	21	71
All sizes	10	36	54

Table 17—Proportion of farmers using selected methods of purchasing feeder cattle, 1980

Feedlot annual sales (head)	Methods of Purchase			
	Farmers buying direct only	Farmers buying personally only	Farmers buying through order buyer or commission firm	Farmers buying through combined methods
	Percent			
20 to 99	18	55	24	3
100 to 199	5	44	30	21
200 to 499	2	21	42	35
500 & over	2	12	50	36
All sizes	10	42	31	17

During 1980, packers operating in the North-Central region bought 81 percent of their slaughter steers and heifers from all sources directly from the feeder; 13 percent came through terminal markets; and only 6 percent were bought at auctions (*9*). This distribution of sales is determined largely by the practices of commercial feedlots that sell cattle to packers within the region, similar to the marketing pattern of the larger farmer feedlots but far different from that of the smaller ones.

Basis of Pricing Slaughter Cattle

In 1980, packers paid for 38 percent of the slaughter steers and heifers purchased in the North-Central region on a grade and yield rather than live weight basis (*9*). Farmer feeders in the region sold 33 percent of their cattle on that basis in 1980 (table 22). Producers operating the smallest feedlots used grade and yield pricing for only 19 percent of their cattle; the largest feedlots sold 43 percent of their cattle on that basis.

Generally, more farmers used the grade and yield method for pricing at least part of their cattle than the proportion of all cattle sold by this method--another example of diversification of alternatives by farmers, especially those with the larger enterprises who sold most of their cattle directly to packers who offer optional pricing methods.

Price Risk Management

The potential returns for cattle feeding depend upon: price margin, which is the difference between the price paid per pound for feeder cattle and the price received per pound for slaughter cattle, and feeding margin, which is the difference between the cost of feed to produce a pound of gain and the price received per pound for the weight gained. Up to a year may pass from the time feeder cattle are purchased and slaughter cattle are ready for sale. The risk is substantial that price fluctuations may

Table 18—Average sales of fed cattle per farm, by sex, 1980

Feedlot annual sales (head)	Average sales (head	Steers	Heifers
	Number	----- *Percent* -----	
20 to 99	45	74	26
100 to 199	134	74	26
200 to 499	298	62	38
500 & over	865	67	33
All sizes	129	68	32

Table 19—Average weight per head of fed cattle sold, by sex, 1980

Feedlot annual sales (head)	Sex of cattle	
	Steers	Heifers
	Pounds	
20 to 99	1,221	1,026
100 to 199	1,140	984
200 to 499	1,155	983
500 & over	1,150	1,008
All sizes	1,168	999

Table 20—Average sales of fed cattle, by sex, quarter of the year, 1980[1]

Feedlot annual sales (head)	All fed cattle				Steers				Heifers			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Percent											
20 to 99	23	22	31	24	19	26	37	18	34	12	14	40
100 to 199	27	28	27	18	22	27	31	20	43	31	14	12
200 to 499	24	22	28	26	28	29	18	25	18	10	44	28
500 & over	24	24	24	28	23	24	24	29	26	25	23	26
All sizes	24	24	27	25	23	26	27	24	27	18	27	28

[1]Q1 is January through March of 1980, with subsequent 3-month periods following in order.

Table 21—Proportion of fed cattle sold through selected markets, 1980

Feedlot annual sales (head)	Type of market			
	Regular auction	Terminal	Direct to packer	Country commission firm
	Percent			
20 to 99	14	48	33	5
100 to 199	23	25	21	31
200 to 499	3	36	56	5
500 & over	1	7	81	11
All sizes	8	28	53	11

eliminate the possibility for profits, or even result in cash losses for an operation.

Producers may assume all of the price risks, buying and selling cattle at the prices prevailing at the time of transactions; however, various methods are available to transfer part of the price risk to others. Two of the most common methods include hedging purchases of cattle on the futures market and forward pricing cattle with a packer before date of delivery.

These methods of transferring price risk have not been used extensively by farmer cattle feeders before. Farmer feeders assumed virtually all of the price risk in 1980. Only 1 percent of all farmers forward priced cattle at least 30 days prior to delivery to a packer, and only 1 percent of all slaughter cattle were involved (table 22). The futures market was similarly little used. Only 2 percent of all farms hedged 3 percent of the total cattle fed. Farmers operating the smallest feedlots made no use of either of these methods to reduce the risk of adverse price changes in 1980. However, a farmer feeder reduces risk because feed is produced on the farm; but, it decreases the potential of earnings from the sale of grain.

Feedstuffs and Feeding

Feedstuffs and how farmers use them are different from methods employed by commercial cattle feedlots, which are usually large single-enterprise operations purchasing all feeds.

Use of Pastures

Cattle on a feeding program are rarely turned out to pasture, but grazing is a part of the overall beef production program on many farms. Feeder cattle raised on the same farm as the feedlot where they will be finished mostly graze before placement on feed. Thirty-nine percent of farms feeding cattle in 1980 raised all feeder animals from their own herds; 58 percent of the farms with the smallest feedlots fed only home-raised cattle (table 10).

Sixty-one percent of all farmers, ranging from 42 percent of the farmers with the smallest feedlots to all of those with the largest feedlots, purchased part or all of their feeder cattle. One-third of all farmers who purchased feeder cattle pastured them before placing them on feed (table 23). The proportion of farmers using pastures for purchased feeder cattle was essentially the same regardless of size of the feeding enterprise. The importance of grazing, however, differed greatly by size of feedlot enterprise. Producers operating the smallest feedlots grazed their purchased cattle for an average of 175 days—approximately the length of the entire growing period in the five-State region—before placing them on feed. The largest feedlots averaged only 35 days of grazing per head, which suggests that the main purpose of putting the cattle on pasture was to provide them time to recover from the stress of transportation and to become accustomed to a new environment.

Stocking rates indicated that some farmers used pastures only as holding areas. Purchased cattle grazing for less than 30 days before entering the feedlot averaged 25 head per nontillable pasture acre, and 40 head per acre on legume-grass crops. When time on pastures exceeded 30 days, the stocking rate averaged two head per acre on both nontillable pastures and legume-grass crops and less than one head per acre on crop residues, chiefly corn after harvest.

Table 22—Proportion of farmers selling and fed cattle sold on grade and yield, forward priced, and hedged on futures market, 1980

Feedlot annual sales (head)	Priced on grade & yield		Forward priced		Hedged on futures market	
	Farms	Cattle	Farms	Cattle	Farms	Cattle
	Percent					
20 to 99	19	19	0	0	0	0
100 to 199	39	27	3	2	5	2
200 to 499	45	35	0	0	5	3
500 & over	45	43	2	3	3	7
All sizes	27	33	1	1	2	3

Table 23—Proportion of farms grazing purchased feeder cattle prior to feedlot placement and days of grazing per head, 1980

Feedlot annual sales (head)	Farms using grazing[1]	Average cattle purchases per farm	Average days of grazing per head[2]
	Percent	*Number*	
20 to 99	30	50	175
100 to 199	38	139	111
200 to 499	28	306	79
500 & over	36	956	35
All sizes	32	206	77

[1]Based on farms with purchased feeder cattle.
[2]Information is not available on the amount of supplemental feed, if any, provided to the cattle while on pasture.

Farmers got 54 percent of their grazing from nontillable pastures. Producers with all sizes of feedlots used such pastures. The general level of availability of nontillable pastures is the difference between cropland and total land (table 4). Crop residues were used by producers with all sizes of feedlots and accounted for 30 percent of the total head days of pasture. Legume-grass crops on tillable land provided 15 percent of total head days of pasture, but only producers with the midsize feedlots used them. The grazing of small grain, common in some of the major wheat-producing regions of the country, accounted for less than 2 percent of the total.

Pastures were rented by 28 percent of the farmers who used grazing for purchased feeder cattle (table 24). On these farms, rented pastures accounted for a fifth of the total acreage used; rental was common only for nontillable pastures. Rental rates for nontillable pastures averaged over $18 per acre or 12 cents per head day but varied according to the acreage rented. Farmers renting 25 to 49 acres paid an average of $25 per acre, or 33 cents per head day. Rental of 50 to 99 acres cost $20 an acre or 12 cents per head day, and the cost for more than 100 acres averaged $13 per acre, or 10 cents per head day.

Kinds of Feedstuffs

Kinds of feedstuffs were a major variable between commercial and farmer feedlot operations. (Inadequacy of farm record information, and the complexities of quantity and quality measurements via the survey approach, precluded any attempt to estimate feed efficiency in the 1981 survey.)

Table 24—Proportion of farmers grazing purchased cattle who rented pastures and the proportion of acres rented, 1980

Feedlot annual sales (head)	Farmers renting pasture[1]	Proportion of acres rented	
		Nontillable pasture	All pastures
		Percent	
20 to 99	19	35	10
100 to 199	23	32	14
200 to 499	58	25	41
500 & over	33	51	25
All sizes	28	35	22

[1]Percentages are based on the number of farms that used pastures for purchased feeder cattle.

Many feedstuffs are suitable for cattle on feed. All can be purchased, and most can also be produced and stored on the farm. Rations may be formulated with a high proportion of grains to deliver maximum energy and rates of gain or with a high proportion of forages which provide less concentrated energy. Grains may be harvested and dried, thus retaining flexibility for feed to many types of livestock or for sale as a cash crop. Grains may be harvested and stored in high-moisture form for use as cattle feed, altering both the costs in grain production and the opportunities for use other than for cattle feed.

The feeding programs in farmer feedlots revolved around grain, grain crop silages (mostly corn), legume hay (mostly alfalfa), and commercial protein supplement (table 25). Hay silage (mostly alfalfa) accompanied good quality hay. Green chop forages were not fed by any of the producers. No other feedstuff was used by as many as 1 percent of the farmers.

Feeding programs may be conducted using the grain in grain-crop silages as the only grain in the ration. All farmer feeders, however, fed grain in addition to that contained in silages. Two-thirds of all producers fed only dry grains. A fifth fed only high-moisture grains, which, in the case of corn, are commonly harvested at grain moistures ranging from 20 to 30 percent, stored in silos, and allowed to ferment for preservation. An eighth of all farmers fed both dry and high-moisture grains.

Two-thirds of all farmers fed corn or other grain crop silages. Silage was even fed by most of the operators of the smallest feedlots where annual requirements of cattle on feed would seldom amount to more than 100 tons of silage. Combinations of dairy and beef cow enterprises, which also use silages, apparently created enough volume to keep the costs of silage harvesting, storing, and handling facilities from becoming prohibitively expensive on a unit basis. The same situation applied to the use of high-moisture grains on farms with small cattle feeding enterprises.

One-fourth of the producers did not use a commercial protein supplement, though this does not necessarily reflect inadequately balanced rations on these farms. Alfalfa hay or hay silage was fed by most producers and could supply most of the protein requirements. Salt and minerals information was not available.

All farms were essentially self-sufficient in feedstuffs, except for protein supplements, which were assumed to be purchased. Farms produced all of the silages fed to cattle, 99 percent of the hay, 95 percent of the corn, and 84 percent of the other kinds of grain which were relatively unimportant compared with corn. Even farms with the larg-

est feedlots grew all of their silages, 91 percent of the hay, and 81 percent of the corn that they fed to cattle.

Rations

Producers provided estimates of the amounts of all feedstuffs fed to cattle on feed in 1980. No attempt was made to evaluate quality of feedstuffs or moisture contents, hence feed efficiency cannot be estimated. These data provide a basis, however, for determining the general types of rations and the relative importance of the major feedstuffs being used by farmer cattle feeders.

Rations were built around grain crop silages, mostly corn silage, on 74 percent of all farms (table 26). Silage-based rations accounted for a successively higher proportion of the feeding programs on farms with the larger feedlot enterprises. Nearly all producers marketing 500 or more fed cattle annually used silage in their feed rations. Over 86 percent of the operations that did not use silage were in the smallest group of feedlots.

Producers reported the distribution of feedstuffs estimated according to weights of feeds on an as-fed basis. The resulting proportions of feedstuffs in the silage-based

Table 25—Proportion of farmers feeding specified kinds of feed to cattle on feed, 1980

Feedlot annual sales (head)	Grain[1]			Corn silage	Other grain crop silage[2]	Hay silage[3]	Legume hay[3]	Other hay	Protein supplement
	Dry only	High-moisture only	Both						
					Percent				
20 to 99	79	13	8	58	*	13	85	10	75
100 to 199	59	34	7	77	19	13	66	1	75
200 to 499	37	30	33	64	10	45	54	0	77
500 & over	35	31	34	88	10	40	57	1	87
All sizes	68	20	12	63	5	18	77	7	76

*Less than 0.5 percent.

[1]The percent of farms feeding corn as the only dry grain was 59, 56, 25, 34, and 53, respectively, for the four size classes and all sizes combined. Grain sorghum was the most frequently fed dry grain other than corn. Only 2 percent of all farms fed high-moisture grains other than corn.

[2]Grain sorghum accounted for most of the silage made from grain crops other than corn.

[3]Most hay silage and legume hay was made from alfalfa or forage mixtures including alfalfa.

Table 26—Percent of farms using rations with and without silage for all feedlots, feedlots with calf programs, and feedlots with yearling programs, 1980[1]

Feedlot annual sales (head)	All farms		Calf programs		Yearling programs	
	Rations with silage	Rations without silage	Rations with silage	Rations without silage	Rations with silage	Rations without silage
			Percent			
20 to 99	44.0	22.5	28.0	13.8	48.9	27.5
100 to 199	14.6	1.8	31.8	5.3	8.4	1.1
200 to 499	10.8	1.7	13.0	5.5	9.1	.8
500 & over	4.5	.1	2.6	0	4.0	.2
All sizes	73.9	26.1	75.4	24.6	70.4	29.6

[1]Farms with calf or yearling programs included 75 percent or more of the cattle placed on feed in 1980 classified as either calves or yearling or older cattle. There were 35,109 farms with cattle feeding enterprises, 7,057 farms with calf feeding programs, and 23,399 farms with yearling feeding programs. The difference between the total number of these farms with specified programs and all farms is the number of farms feeding cattle that fed less than 75 percent of either calves or yearlings or older animals.

programs was rather typical of rations designed for daily gains of 2 to 2.5 pounds per head, depending upon age and sex of the cattle (table 27). Grains averaged nearly a third of the total weight, grain crop silages nearly half, and legume hay and hay silage accounted for about a fifth. Protein supplements added less than the usual proportion of the weight of such rations, but the needed protein was apparently supplied by the somewhat larger amounts of legume hay equivalents in the hay-hay silage combinations. All other feedstuffs combined, most of which were nonlegume hay, straw, and corn stover, accounted for less than 1 percent of all silage-based rations.

Silage-based feeding programs for calves and yearling cattle, identified as enterprises for which placements of cattle in 1980 were 75 percent or more of the specified type of cattle, showed distributions of feedstuffs similar to that for all farms. Rations for calf feeding programs averaged somewhat higher in forages but lower in grains and grain crop silages than the programs involving yearling or older cattle, following the usual practice of feeding more forages to younger cattle.

The composition of rations excluding silage was estimated only for producers with the smallest feedlot enterprises. They managed nearly all of the farms on which silage was not part of the feedlot ration. Rations on these farms averaged about 60-percent grain by weight; legume hay, other forages, and protein supplement accounted for most of the remainder. This reflects rations of moderate energy

Table 27—Composition of rations for cattle on feed, by major kinds of feed, type of cattle, 1980

Feedlot annual sales (head)	Major feedstuffs[1]						
	Dry grain	High-moisture grain	Grain crop silage	Legume hay	Hay silage	Protein supplement	All other feedstuffs
				Percent			
All feedlots on—							
Rations with silage:							
20 to 99	25.5	11.8	46.8	7.9	7.0	1.0	*
100 to 199	18.8	9.1	52.0	5.2	9.3	1.8	3.8
200 to 499	14.2	18.9	37.7	3.1	24.0	1.4	.7
500 & over	14.8	18.3	49.5	3.6	12.2	1.5	.1
All sizes	18.1	15.1	45.7	4.9	13.9	1.4	.9
Rations without silage:[2]							
20 to 99	58.0	1.2	0	31.8	0	3.4	5.6
Calf programs on—[3]							
Rations with silage:							
20 to 99	30.0	4.1	45.1	2.5	16.4	1.9	0
100 to 199	18.2	8.8	52.9	4.7	12.9	2.0	.5
200 to 499	20.0	10.8	31.9	3.7	31.6	2.0	0
500 & over	12.1	18.1	51.6	10.9	4.2	2.8	.3
All sizes	20.4	9.9	43.2	4.8	19.4	2.1	.2
Yearling programs on—[3]							
Rations with silage:							
20 to 99	23.8	14.2	46.6	9.2	4.8	1.4	*
100 to 199	23.0	5.1	60.1	5.0	4.3	2.5	0
200 to 499	10.9	26.5	41.8	2.1	15.4	1.9	1.4
500 & over	15.4	18.1	49.3	2.3	12.4	2.4	.1
All sizes	17.8	17.4	47.4	4.8	9.6	2.6	.4

*Less than 0.05 percent.

[1]Percentages are based on the weight of feedstuffs as fed. To estimate approximate equalities, high-moisture grain can be assumed to contain 25-percent moisture and dry grain, 15.5 percent. One unit of hay is roughly equivalent to two units of hay silage.

[2]Farms using rations without silage were too few to permit reliable estimates of ration composition except for those with the smallest feedlots.

[3]Seventy-five percent or more of the cattle placed on feed in 1980 were calves or yearlings or older in these programs. Thirteen percent of all farms had programs that did not meet these constraints; data on their rations appear only in the all feedlots section of this table.

content compared with high concentrate rations which commonly contain around 80-percent grain by weight.

High-moisture grains made up nearly half of all grains fed on a weight basis, especially on farms with large cattle feeding enterprises. Dry grains contain about 85 percent dry matter (more energy), and high-moisture grains average about 75 percent. More high-moisture grains were used on the smallest feedlot farms compared with the next size level of feedlot, reflecting more varied livestock enterprises, especially dairy, in association with the small feedlots.

In summary, farmer cattle feeders rely almost completely on feedstuffs produced on their own farms. Most operators use rations based on grain crop silages, plus grain, with nearly half of the grain in high-moisture form. They make substantial use of legume hay and hay silages which provide a major portion of the protein requirements. About a third of the farmers with the smallest feedlots use grain-hay rations without silage, not common on farms with the larger sizes of feedlots.

Preservation of High-Moisture Feedstuffs

Natural fermentation and storage that excludes or limits exposure to oxygen is the primary means for preserving high-moisture grains and silages. Most producers consider storage sufficient for preservation of these feedstuffs, but some add materials during the storing process to enhance preservation.

One-eighth of the producers using high-moisture grains and grain crop silages added materials during the storage process. Only 4 percent of those making hay silage did so (table 28). Generally, feeds stored in small quantities pose a greater risk of deterioration of quality or spoilage through exposure to air than do feeds stored in large quantities. Few of the operators with the smallest feedlots used additives, but their volume of high-moisture feedstuffs was relatively high because of the presence of other livestock enterprises in addition to the small feedlot. The most frequent use of additives was on farms with annual sales of 100 to 199 fed cattle but essentially no dairy cattle. Few of the farmers with the larger feedlots used additives because of larger storage units and use of airtight storage structures.

Propionic acid alone, or combined with acetic acid, was used by 83 percent of the farmers who treated high-moisture grains. Commercial products of unspecified content were used by the remainder. One-fifth of the producers who treated grain crop silages applied ammonia; four-fifths used a commercial product. Commercial products were used by all producers who treated hay silages.

Additives to Improve Feed Efficiency

A number of synthetic products are available for use with feedstuffs to improve the feed efficiency of cattle. Rumensin, an antibiotic-like ingredient, improves feed efficiency by aiding microbial digestion in the rumen, especially for forages. Other commercial products provide hormones which stimulate growth.

Most cattle feeders with the larger feedlot enterprises used both types of products (table 29). Rumensin was fed by half of the operators of the smallest feedlots, but less than a fourth of them used any kind of growth stimulant.

Feed Processing and Distribution

Choice of the form in which grains are fed to cattle involves several variables including feed efficiency, the effectiveness of the feed mixing and distribution system in

Table 28—Proportion of producers adding materials to, or treating, high-moisture feedstuffs at time of storage, by kind of feed, 1980

Feedlot annual sales (head)	Kind of feed[1]		
	High-moisture grain	Grain crop silage	Hay silage
	Percent		
20 to 99	8	*	0
100 to 199	26	52	15
200 to 499	8	4	8
500 & over	6	14	1
All sizes	12	13	4

*Less than 0.5 percent.
[1]The base for computing the percent of farms using additives is the number of farms using each of the specified feedstuffs.

Table 29—Proportion of farms using specified additives to enhance feed efficiency, 1980

Annual sales (head)	Rumensin	Hormone materials
	Percent	
20 to 99	50	23
100 to 199	58	68
200 to 499	81	79
500 & over	89	77
All sizes	57	40

use, and, in the case of high-moisture grains, the effectiveness of packing and exclusion of oxygen from the grain in storage. When grains are processed rather than fed as whole grains, the choice of the method is determined by volume to be processed, whether the grain is dry or of high moisture, and, concerning high-moisture grain, whether it is to be processed at harvest when it goes into storage or daily as it is being fed to cattle.

Mill capacities per unit of time, initial cost, and types of distribution systems are major factors and also determine the choice of type of processing. The high rate of output of a roller mill is often better suited for systems where high-moisture grains are processed at harvest when they go into storage. Processing is not required for effective storage when sealed or airtight storage structures are used.

Over three-fourths of all producers processed dry grain instead of feeding it as whole grain (table 30). Typically, dry grains were ground in the smaller operations and rolled in the larger ones. Nearly 90 percent of all producers processed high-moisture grains rather than feeding them whole. The size of enterprise affected choice the same way as processing of dry grains. Rolling was most often the method used to process high-moisture grains regardless of size of enterprise.

About three-fourths of all producers owned some type of equipment for processing grains regardless of size of cattle feeding enterprise. Only 7 percent of all producers paid for custom processing of feeds. On some farms, multiple types of feed mills were used, but one method of processing grains was usually dominant.

Table 30—Proportion of farms using selected methods of processing dry and high-moisture grains, 1980

Feedlot annual sales (head)	Methods of processing[1]			
	None	Ground	Rolled	Other
		Percent		
Dry grain:				
20 to 99	25	59	12	4
100 to 199	7	79	14	0
200 to 499	43	33	24	0
500 & over	14	8	78	0
All sizes	23	59	15	3
High-moisture grain:				
20 to 99	0	44	50	6
100 to 199	11	53	36	0
200 to 499	25	24	46	5
500 & over	23	11	62	4
All sizes	11	38	47	4

[1]Percentages are based on the number of farms feeding the specified kinds of grains.

A popular processor is the tractor-powered, mobile grinder-mixers which provide a combination of services—grinding, mixing, hauling, and delivering feed into feeders. They can usually be operated with tractors already available on the farm. Mobile grinder-mixers were the most common type of grain processing equipment on farms with small cattle feeding enterprises (table 31). These farms usually had livestock enterprises other than cattle feeding for which a mobile mill could be used. Fewer farms with small feedlots used silages which required other delivery equipment.

Roller mills, commonly electrically powered, were used by most of the producers with large cattle feeding enterprises. High-moisture grains, fed more often by producers with large cattle feeding enterprises, were usually rolled rather than ground. Roller mills, more suited than tractor-powered mills to the mobile and mechanical feedbunk delivery systems, better handle both silages and concentrates on the larger operations.

Self-unloading, tractor-operated feed wagons or feed trucks were used on half of the farms with the smallest feedlots and nearly all those with the largest feedlots. This equipment usually delivered all feedstuffs in combination. Eighty to ninety percent of the units hauled feedstuffs in layers, mixing on delivery into feedbunks on all farms except those with the largest feedlots. Much of the equipment on the largest feedlots mixed feedstuffs in transit, and nearly half contained scales to weigh feeds in the load.

Mechanical bunk feeders, used on about half of the farms with the midsize feedlots, delivered feedstuffs to cattle in a continuous flow process from storage through processing and into the feeders. Mobile equipment was often kept to service part of the cattle, even on farms with mechanical feedbunk distribution systems. Few farmers used hay processing and handling equipment. Only 1 percent of all producers used bale shredders and hay grinders. Some farms used equipment to move hay stacks and large round bales of hay, on dairy and cattle raising enterprises, especially on farms with small feedlots.

Investments in feed processing and distribution equipment were generally spread over the 20 years before 1980 (app. table 11). Nearly half of all feed milling equipment was more than 10 years old. The ages of feed distribution equipment reflected a similar pattern.

Producers used several types of feeders (table 32). The smaller feedlots usually employed only one type of feeder, but the larger feedlots often had at least two.

Portable bunk feeders, relatively low in cost but requiring the hauling of feedstuffs into the feedlot, were used on nearly two-thirds of all farms regardless of size of enterprise. They were the dominant type of feeder in small operations, but were used only for small numbers of cattle in the large operations.

Fence line bunk feeders, which are well suited to mobile distribution of feedstuffs when serviced from outside of the feedlot, served nearly two-thirds of the farms with the largest feedlots. Medium-sized farm feedlots employed in-lot mechanical bunk feeders, expensive on a unit basis for small feedlots. Mobile distribution better fits the overall feed storage and distribution system for large feedlots. A third of the producers used combination mechanical bunk feeder and mobile distribution systems in each of the three larger size classes; only 6 percent of the smallest used such a combination. Self-feeders for dry concentrate feeds served about a fifth of all producers.

The various types of bunk feeders provided an average of 1.6 linear feet of feeding space per head of feedlot capacity. Small feedlots, filled to capacity, had enough feeder space for all cattle to feed at once. Large feedlots were designed for continuous availability of feed to the cattle, allowing less than 1 foot of feeding space per head of feedlot capacity.

Production Facilities

The long-term depreciable assets used by farmer cattle feeders are typically quite different from those used in

Table 31—Proportion of farmers using specified types of equipment for feed processing and distribution, 1980

Feedlot annual sales (head)	Type of equipment[1]						
	Mobile grinder-mixer	Other grinding mills	Roller mills	Self-unloading feed wagon or truck	Mechanical bunk feeder	Haystack mover	Big haybale mover
	Percent						
20 to 99	50	12	13	48	20	8	28
100 to 199	51	13	25	84	50	3	11
200 to 499	24	10	41	70	49	6	30
500 & over	10	12	63	90	42	19	13
All sizes	45	12	21	60	29	7	25

[1]Roller mills and mechanical bunk feeders are operated by electric motors. All other equipment is tractor-powered or self-propelled.

Table 32—Proportion of farmers using specified types of feeders, 1980

Feedlot annual sales (head)	Type of feeder				
				Self-feeder	
	Fence line bunk feeder[1]	Portable bunk feeder[1]	Mechanical bunk feeder[2]	Dry feed	Liquid feed
	Percent				
20 to 99	11	60	20	22	7
100 to 199	28	63	51	28	1
200 to 499	39	69	49	20	17
500 & over	64	63	42	13	2
All sizes	20	62	29	22	7

[1]Feeders filled with mobile equipment.
[2]Feeders filled mechanically by augers, belts, chain conveyors, and other devices.

commercial feedlot operations. Farmers usually invest more per unit of fed beef produced than do commercial cattle feeders. Part of the difference stems from differences in economies of size and intensity of use of facilities. The two most important factors, however, are climate and sources of feedstuffs.

Most farmer feedlots are located in areas of moderate precipitation. Many producers consider shelter buildings essential for cattle. Commercial feedlots are, for the most part, in drier areas of the country and seldom provide shelter for cattle.

Farmer feeders produce and store virtually all of the feedstuffs fed to cattle. Feedstuffs are committed to the cattle enterprise at relatively low harvest-time values, but investments in feed storage and the related fixed cost are relatively high. Commercial feedlot operators usually purchase feeds throughout the year, paying average annual prices and transportation charges but storing only a small part of annual feed usage.

Cattle Shelter Buildings

In 1980, 45 percent of all farms had open-lot systems without shelter (table 33). Most feedlots without cattle shelter spanned the western part of the farmer feeding area where precipitation is less than in the central and eastern parts.

Shelter buildings used for cattle are constructed as three basic types: (1) open-front sheds allowing free access to open-lot space, (2) fully enclosed, or warm confinement, buildings, and (3) open-sided, or cold confinement, buildings. Cattle housed in confinement buildings have no access to open-lot space.

The open-front shed and lot system, the dominant (80 percent) method of housing in 1980, is the traditional way to house cattle in farmer feedlots. The system was combined with mostly cold confinement on 16 percent of the farms. Only 4 percent of the farmers used only confinement housing, which was primarily warm shelter on farms with the smaller feedlots and cold confinement housing on farms with the larger feedlots.

Much of the shelter space, especially on farms with small feedlots, was provided by traditional open-front sheds (table 34). Cold confinement barns accounted for much of the remainder, especially in the larger operations. Cold confinement buildings are often used for the final part of a feeding program. Warm confinement barns, which are little used, originated during the fifties patterned after total confinement housing for hogs. The exceptionally high initial cost and problems with environmental control, especially inadequate ventilation, made cold confinement buildings more attractive.

Periods of investment in housing varied depending on profitability of cattle feeding and development of technology. More than 40 percent of the open-front shed space was constructed between 1960 and 1969, when the fed beef industry expanded the most (app. table 12). Over a fifth was built in the last half of the seventies, while the cattle-raising sector was undergoing substantial liquidation. Buildings older than 30 years accounted for about a fifth of total space in open sheds.

Cold confinement cattle barns are a recent development. Nearly three-fourths of this shelter space was constructed in the seventies. Warm confinement barns, which provided little of the shelter, were built mostly during the fifties and sixties. Producer estimates placed 40 percent of warm

Table 33—Proportion of farms using specified types of cattle shelter buildings, 1980

Feedlot annual sales (head)	Type of cattle shelter[1]					
	None	Open-front shed	Warm confinement	Cold confinement	Open-front shed confinement barns	Mixed confinement
				Percent		
20 to 99	48.0	42.5	1.2	0.3	8.0	0
100 to 199	37.3	49.7	2.0	1.5	9.5	0
200 to 499	39.0	48.4	0	1.2	11.4	0
500 & over	40.8	40.5	0	8.6	9.3	.8
All sizes	44.8	44.3	1.1	1.0	8.8	*

*Less than 0.05 percent.

[1]Open-front sheds allow cattle free access to lot space. Warm confinement barns are fully enclosed. Cold confinement barns have open sides. Cattle in confinement housing do not have access to outside space.

confinement building prior to 1950, but these buildings are nothing more than old enclosed barns built long before specialized warm confinement barns had been developed for housing cattle.

None of the open-front sheds was equipped to handle cattle manure other than in solid form. Most small feedlots had dirt floors (app. table 13). Sheds in the larger enterprises usually had paved floors. Overall, two-thirds of the total floor space in shed housing was paved; one-third was dirt. Paved floors were dominant in both types of confinement housing, accounting for 84 percent of the total space in warm buildings and 70 percent in cold confinement housing. Much of the remaining floorspace in confinement housing was slotted over pits for liquid storage of manure. Flush or scrape systems for cleaning of confinement buildings are rare.

Farmers who had shelter buildings did not provide shelter for all of their cattle. Shelter space averaged less than half of the capacity of feedlots (table 34). Sheltered and open-lot systems may be combined on some farms, but most producers likely start cattle on feed in open lots, then move them into sheltered systems for the final part of the finishing program, especially when confinement housing is used.

Paved Lots

Open-lot space was available in most feedlots. Only 2 percent of the producers kept all cattle in confinement housing. The West contained most of the open feedlots without shelter buildings, and used only dirt lots. Some of the farms with shelter buildings, especially those with the smallest feedlots, also used only dirt lots.

Overall, only 37 percent of all farms had paved feedlots (table 35). Paved lot areas on these farms averaged about 50 square feet per head of feedlot capacity, which is the amount generally recommended for surfaced open lot systems that provide no shelter buildings. To the extent that cattle have free access to shelter, this is nearly twice the amount considered necessary.

Hay Storage

Hay was a part of cattle feeding rations on more than three-fourths of all farms. Hay was stored under roof in the more humid parts of the study area. Producers used temporary covers, and even stockpiled without protection in the drier western portion of the area.

Seventy percent of the farms that used hay in feedlot rations stored hay under roof. Storage capacity on these farms was equal to, or greater than, need based on feedlot capacity and ration compositions. Old buildings housed most hay. Forty-two percent of total storage capacity was in buildings over 30 years old; only 7 percent of building capacity was constructed in 1970 or later (app. table 12).

Storage for High-Moisture Feedstuffs

Operators of farmer feedlots produce nearly all of the grains and silages they feed to cattle. Multiple fillings of storage structures during 1 year are sometimes possible when feed crops are harvested in sequence. This applies

Table 34—Distribution of shelter space by type of building and amount of shelter space, relative to feedlot capacity and sales of fed cattle, 1980[1]

Feedlot annual sales (head)	Animal capacity of shelter buildings per farm[2]	Distribution of shelter space			Shelter capacity, relative to feedlot capacity[3]
		Open sheds	Cold confinement	Warm confinement	
	Number	*Percent*			
20 to 99	51	90	3	7	63
100 to 199	72	68	12	20	36
200 to 499	160	63	33	4	46
500 & over	332	56	42	2	45
All sizes	86	72	21	7	48

[1]Only farms providing shelter buildings for cattle on feed are included in these estimates.
[2]Capacity of shelter buildings was estimated by the producer or computed from size of buildings and space requirements per head as specified by the Midwest Plan Service in "Beef Housing and Equipment Handbook," MWPS-6, Iowa State University, Ames.
[3]Shelter capacity divided by feedlot capacity.

largely to silages, especially hay silages. Mostly, however, feed storage capacity must be sufficient for all of the feedstuffs to be fed to cattle during a year from one crop harvest to the next.

Storage is also required for dry grains. However, they are not committed to the cattle enterprise until fed. At any time, they can be sold for market price or diverted to other livestock enterprises on the farm. Market price is therefore the cost of dry grains fed to cattle, and storage is a part of the cost of the crop enterprise. Over time, market price of dry grains reflects the costs of storage (*8*).

Ensiling of grains, usually at moisture levels of 20 to 30 percent, is advantageous when produced and fed to cattle on the same farm. Once ensiled, however, high-moisture grains are largely committed to the cattle feeding enterprise. They are salable only under unique circumstances, and other livestock enterprises to which high-moisture grains may be fed are often not a part of a farm business. Costs to the cattle feeding enterprise are, therefore, the market value of high-moisture grains at time of harvest plus the costs associated with the storage structures necessary to keep the grains until fed. The same applies to grain crop and hay silages. Farmer feedlot enterprises usually incur higher investments and associated fixed costs but reduced feed costs per unit of output than do commercial feedlots (*11*).

Table 35—Proportion of farms using paved lots and amount of paved lot area per head of feedlot capacity, 1980

Feedlot annual sales (head)	Farms with paved lots	Paving per head of feedlot capacity[1]
	Percent	*Square feet*
20 to 99	29	69
100 to 199	48	52
200 to 499	62	35
500 & over	44	45
All sizes	37	49

[1]Based on data from farms that used paved lots.

High-Moisture Grain Storage

High-moisture grains may be stored in either open or airtight upright silos or in horizontal silos. The amount of grain to be stored and initial cost of the structure determines which kind of silo. Open upright silos are less expensive than airtight silos, but losses from spoilage and maintenance of quality during feeding present problems. Horizontal silos, while relatively inexpensive to construct per unit of storage capacity, result in excessive losses to spoilage unless total volume is quite large. High-moisture grains may be treated and stored in conventional bins designed for storage of dry grains if they are conditioned to prevent rust, but this method of storage was not used in any of the cattle feeding operations.

Small volume cattle feeders who fed high-moisture grains usually used open upright silos for storage (table 36). Airtight silos were favored on farms with the larger feedlots. Horizontal silos were used by only a small proportion of all producers and only on farms with the larger feedlots.

Most producers used open upright silos rather than airtight silos for storage of high-moisture grains; however, airtight silos accounted for most of the total storage capacity even on farms with the smallest feedlots (table 37). Sixty percent of the total storage capacity for high-moisture grains was held in airtight upright silos, 38 per-

Table 36—Proportion of farms using specified types of storage for high-moisture grains, 1980

Feedlot annual sales (head)	Type of high-moisture grain storage				
	None	Nonairtight upright silo	Airtight upright silo	Horizontal silo	Combinations of types
			Percent		
20 to 99	79	14	7	0	0
100 to 199	60	23	16	0	1
200 to 499	37	28	32	3	0
500 & over	35	17	36	7	5
All sizes	68	18	13	1	*

*Less than 0.5 percent.

cent in open upright silos, and only 2 percent in horizontal silos. Storage capacity, based on corn, averaged 42 bushels per head of feedlot capacity of farms where grains were fed only in high-moisture form.

Few grains were harvested in high-moisture form until the combine method of harvesting corn, which began in the midfifties. Nearly half of the total storage capacity used for high-moisture grains in both open and airtight upright silos was constructed during 1960-69, coinciding with both the development of new harvesting technology and the rapid expansion of the cattle feeding industry (app. table 12). Substantial construction of airtight storage occurred later, especially during 1975-79. Construction of open upright silos for grain storage dropped sharply after the sixties; and many of the structures were 30 or more years old, indicating that they had been built originally for silage, then converted to use as grain storage.

Table 37—Proportion of capacity for storage of high-moisture grains, by type of storage, 1980[1]

Feedlot annual sales (head)	Type of high-moisture grain storage		
	Nonairtight upright silo	Airtight upright silo	Horizontal silo
	Percent		
20 to 99	42	58	0
100 to 199	37	53	10
200 to 499	48	52	0
500 & over	22	75	3
All sizes	38	60	2

[1]Storage includes only grains to be fed to cattle on feed.

Silage Storage

Most farmer cattle feeders used silages as part of their cattle feeding rations. Silage storage options are the same as for high-moisture grains. Factors affecting choice of storage are also the same but are less important because unit values of silages are less than for grains; also, quantities of silages used are much greater.

Most producers who fed silages to cattle used open upright silos for storage, especially those with the smaller feedlots (table 38). Horizontal silos, including various designs of bunkers, trenches, and stacks, were the second choice of farmers overall, but were the dominant method for storing silages on farms with the largest feedlots. The high initial cost of the airtight upright silos, coupled with the lower unit value of silages, diminished their use.

The distribution of capacity for silage storage followed the same pattern as use of silos by type. Open upright silos accounted for 44 percent of total storage, horizontal silos 35 percent, and airtight upright silos 21 percent (table 39). On farms with the smallest feedlots, the presence of dairy and beef cow enterprises meant a high volume of silages stored to satisfy the needs of the feedlot and resulted in substantial use of horizontal silos. Otherwise, horizontal silos were used on farms with the larger feedlots where cattle feeding was the dominant type of livestock.

Capacity for storage of silages averaged 2.6 tons per head of feedlot capacity, generally consistent with the needs of feeding programs that emphasize grain crop silages in the ration with much of the legume forage in the form of hay silage rather than hay. Both were characteristics of these farmer cattle feeders.

Construction of upright silos used for storage of silages coincided with the fed cattle industry expansion of the six-

Table 38—Proportion of farms using specified types of storage for silage, 1980[1]

Feedlot annual sales (head)	Types of silos				
	None	Nonairtight upright silo	Airtight upright silo	Horizontal silo	Combinations of types
			Percent		
20 to 99	34	35	7	20	4
100 to 199	12	63	10	15	0
200 to 499	13	25	17	30	15
500 & over	2	21	5	41	31
All sizes	26	38	9	21	6

[1]Storage is included for both grain and hay crop silages.

ties (app. table 12). Over 80 percent of the capacity on airtight silos was constructed during that period. Newer structures accounted for most of the storage capacity in horizontal silos. Horizontal silos built in 1970 or later housed nearly three-fourths of total horizontal silo capacity. Major factors in this investment pattern are probably the higher unit costs of upright silos, improved methods for managing horizontal silos, and larger enterprises which use more silage, and can effectively reduce the proportion of feedstuffs lost due to spoilage.

Miscellaneous Facilities

A number of miscellaneous facilities and services are employed by feedlots. Most of these facilities are not major investments but reflect a degree of flexibility in operating procedures, insurance against risks, and the availability of management aids.

Electricity is essential to most cattle feeding operations. Loss of power may interrupt the feed processing and distribution system and the supply of water. Feedstuffs may then become inaccessible, especially if stored in airtight upright silos which are unloaded from the bottom. Few producers use fully enclosed buildings, but those who do usually depend upon powered ventilation. Without ventilation, especially in summer, cattle are endangered.

The importance of uninterrupted electrical service has prompted some producers to invest in auxiliary generators. One-third of all cattle feeders had auxiliary generators which were about equally distributed among farms with the different sizes of enterprises (table 40). These generators are usually tractor-powered, but some are engine-equipped and self-starting.

Table 39—Proportion of capacity for storage of silage, by type of silo, 1980[1]

Feedlot annual sales (head)	Type of silo		
	Nonairtight upright silo	Airtight upright silo	Horizontal silo
	Percent		
20 to 99	40	14	46
100 to 199	65	26	9
200 to 499	31	27	42
500 & over	31	16	53
All sizes	44	21	35

[1]Storage includes only silages to be fed to cattle on feed.

The type of electrical service may also be important to a feedlot operator in terms of size, cost, and type of electric motors that can be used (*6*). Three-phase electrical service was available to 28 percent of the farms with the largest feedlots, but to only 11 percent of all farms.

Cattle handling facilities partly determine labor use and management of a feedlot. Squeeze chutes to immobilize cattle for treatment were used by most producers with larger enterprises but on less than a third of the farms with the smallest feedlots. High pressure sprayers were used similarly. Livestock trailers, either tractor- or truck-drawn, were available on 14 percent of the farms, but were not commonly used for hauling cattle.

One-fourth of the operators of the largest feedlots had scales large enough to weigh cattle either on a walk-on basis or in trucks. These scales were rare on other farms. Only 3 percent of all farms had the capacity to weigh cattle.

Use of Tractors and Trucks

Farmers used several methods of materials handling and transporting in feedlot operations, sometimes using multiple methods in the same operation. Tractors and trucks were widely used on nearly all farms. Few of the tractors and trucks, however, were used only for feedlot work or sized specifically for the feedlot activities for which they were used. Most were general purpose machines used in both crop and livestock enterprises.

Tractor Use

All farmers used some tractor power in their feedlot operations. On most farms, tractors provided the major source of power even though electrically powered equipment was prominent in processing and conveying feeds. Over 90 percent of all farmers used tractor power for cleaning feedlots, loading, hauling, and spreading manure (app. table 14). A fifth of all farmers supplemented or replaced tractor manure loaders with self-propelled skid loaders. Three-fourths of all farmers used tractors for hauling and distributing feed to cattle, and two-thirds used tractors for powering feed processing machinery. Size of feedlot enterprise had no bearing on the proportion of farmers using tractors for these activities.

The multiple enterprise organization of the farms in this study, and in particluar a relatively large crop production base, resulted in tractor power being readily available for use in cattle feeding activities. Choice of tractor power was apparently determined by a combination of availability, requirements of the various activities, and convenience. Four-fifths of all farms used two or more tractors in

feedlot work; 10 percent used four or more. Only a fifth of the farms handled feedlot work with a single tractor.

Annual tractor use for all farm purposes averaged 406 hours per tractor for tractors of all sizes. Generally, small and large tractors were used less than midsize ones; farmers operating larger feedlots (and larger farms) used tractors more than did those with the smaller operations (app. table 15).

More than two-thirds of tractor use hours during 1980 was for work outside feedlots. The proportion of use for cattle feeding fell below a fourth on farms with the smallest feedlot enterprises and was only a little more than half on farms with the largest feedlots. Generally, most tractors would apparently have been on surveyed farms even without the cattle feeding enterprises.

The range in size of tractors used for feedlot activities, from 50 to more than 200 horsepower (hp), covered the range of availability, giving further indication of their general, rather than specific, purpose (app. table 16). Nearly 30 percent of all tractors ran less than 50 hp, but almost a fifth exceeded 110 hp. Many tractors were much larger than required. The smaller tractors, apparently relatively old machines, and probably downgraded from fieldwork, were kept for use mostly in livestock enterprises.

Fifty-seven percent of all tractors in feedlot work used diesel, 41 percent operated on gasoline, and 2 percent employed liquefied petroleum (LP) gas. Diesel tractors were generally larger than tractors using gasoline, accounting for 70 percent of the total hp hours of feedlot activities; gasoline tractors showed 29 percent of hp hours, and LP units only 1 percent (app. table 17).

Tractor use averaged 2 hours per head of fed cattle produced, ranging from 3.4 hours per head on farms with the smallest feedlots to 1 hour per head on farms with the largest feedlots (table 41). Tractors used for feedlot activities averaged nearly 80 hp regardless of size of enterprise, so total tractor hp hours per unit of production declined similarly as size of enterprise increased. Calf feeding programs took about 15 percent more tractor time per head than programs involving yearling or older cattle.

Tractor use per unit of production was the least on farms with the largest feedlots, partly because of economies of size and partly because of differences in types of equipment. The two major feedlot activities for which tractors were used--feed processing and distribution and manure handling--accounted for most of total tractor use. These tasks took equal tractor time for all sizes of feedlots. Tractor time per head was substantially reduced for each activity on farms with the larger feedlots. Hours of self-propelled skid loader use equaled about 5 percent of the tractor time used for all sizes of enterprises, not a factor in cutting tractor input for manure handling per unit of production; larger loaders and higher capacity spreaders reduced tractor time for this job. In feed processing, however, electrically powered feed mills ran from 22 percent of total mill time on farms with small feedlots compared with 60 percent on farms with the largest feedlots. Some of the larger feedlots employed feed trucks rather than tractor-drawn feed delivery wagons.

Truck Use

Trucks were used on farmer cattle feeding enterprises almost as extensively as tractors (app. table 18). Ninety-three percent of all cattle feeders owned a truck. Small, or pickup, trucks were used on 86 percent of all farms.

Pickup trucks on all farm activities averaged over 7,600 miles, midsize trucks averaged 3,800 miles, and nearly 23,000 miles were recorded on trucks larger than 5 tons

Table 40—Proportion of farms equipped with specified facilities related to feedlot activities, 1980

Feedlot annual sales (head)	Type of facility					
	Generator for electricity	Three-phase electrical service	Cattle squeeze chute	Livestock or truck scales	High pressure sprayer	Livestock trailer
	Percent					
20 to 99	33	6	29	1	27	10
100 to 199	25	19	48	2	30	20
200 to 499	43	19	76	8	44	27
500 & over	42	28	70	24	58	19
All sizes	33	11	40	3	31	14

(app. table 19). Farmers indicated, however, that less than a fourth of the total mileage focused on feedlot purposes, including hauling of cattle.

Most producers used trucks for several activities related to the feedlot (app. table 14). Half used trucks for hauling at least part of their feeder and slaughter cattle; a fourth hauled purchased feed.

Farmers drove trucks an average of 17 actual miles or 23 ton-miles for each head of fed cattle produced for all feeding programs (table 42). Truck use per unit of production dropped on farms with the larger feedlots compared with smaller feedlots because of economies of size, use of larger trucks, and employment of custom haulers to move most feeder and slaughter cattle.

Farmers who reported hiring truckers to haul cattle typically spent about $10 per head for this service. Costs for custom hauling were split about equally between the hauling of feeder and slaughter cattle.

Waste Management

Cattle feeders must remove manure and other wastes from their cattle feeding operations to keep the feedlot in suitable condition for cattle and avoid pollution. The type of feedlot facilities, type and size of farm operating the feedlot, and use of bedding materials determined whether and how feedlot wastes were handled.

Use of Bedding

Cattle feedlot bedding depended on the availability and cost of materials, the type of feedlot facilities, and climate. Small grain production declined in areas of heavy fed cattle production, and most corn is now combined. Both changes have sharply reduced supplies of the most common bedding materials, straw and corncobs, increasing their costs. Open sheds, the dominant type of housing for farmer feedlots, usually contain bedding materials. Confinement housing equipped with slotted floors, now used by a small proportion of feedlot operators, eliminated the need for bedding. Open-lot systems without housing, which are common in the drier western portion of the farmer feeding area, require little bedding.

Seventy percent of all farmer feeders used bedding in their feedlots in 1980, averaging about 20 tons of bedding per 100 head of fed cattle produced (table 43). Smaller feedlot farmers used more bedding than other feedlot operators. Producers with the largest feedlots mostly used either open-lot systems without shelter or totally confined housing. Ninety-one percent of farmers provided bedding for calves; only 53 percent of farmers with yearling programs did so.

Most farmers who used bedding got all materials from home-produced crops. Purchases of bedding, averaging 90 percent of use, were made by 14 percent of the farmers who used bedding. Four-fifths of these producers bought straw at an average price of $50 per ton. About an eighth bought corn cobs, paying an average $13 per ton.

Table 41—Amount of tractor use for feedlot activities, 1980[1]

Feedlot annual sales (head)	Tractor use[2]	
	Actual tractor hours per head	Tractor horsepower hours per head[3]
	Hours	
20 to 99	3.4	258
100 to 199	2.5	206
200 to 499	1.6	120
500 & over	1.0	90
All sizes	2.0	161

[1]Tractor time includes all uses for feedlot related activities including spreading manure. Time for producing, harvesting, and storing feed crops is not included.
[2]Self-propelled skid loaders for cleaning lots and shelter buildings are not included in tractor use. They were used by a fifth of all producers. Most were 35 to 45 hp, and their use equaled about 5 percent of actual tractor hours regardless of size of feedlot enterprise.
[3]Actual tractor hours times size of tractors in horsepower.

Table 42—Amount of truck use for feedlot activities, 1980[1]

Feedlot annual sales (head)	Truck use	
	Actual truck miles per head	Truck ton miles per head[2]
	Miles	
20 to 99	33	35
100 to 199	14	15
200 to 499	12	25
500 & over	8	15
All sizes	17	23

[1]Truck mileage included owned trucks only and included all uses for feedlot related activities including the hauling of supplies and feeder cattle to the farm and slaughter cattle to market. Averages for calf and yearling feeding programs did not differ significantly from the average of all feeding programs.
[2]Actual miles driven times size of trucks in tons.

Systems of Handling Wastes

Most producers removed wastes from feedlot facilities in 1980 (table 44). Only 5 percent of all farmers operating extensive open-lot systems avoided handling wastes completely. Open-front cattle sheds with lots and open lots without shelter for the cattle were the dominant facilities, so virtually all farmers handled manure in solid form. About a fifth of the producers with the largest feedlots handled part or all of their cattle wastes in liquid form, but only 3 percent of all farms handled any wastes in liquid form.

A number of alternatives exist for using feedlot wastes. However, more than 98 percent of farmer feeders used wastes only for fertilizer.

Farmer feeders did not receive the maximum benefit from wastes (4). Wastes produced inside shelter buildings, especially when bedding or liquid storage were provided, retained maximum value. However, only about half of all farmer feedlots employed these methods. Forty-five percent of all farmer feedlots were open-lot systems without shelter buildings for the cattle. Sixty-three percent, mostly those who operated open-lot systems, used no paving. Many farmers who used open-shed housing also used no paving. The high proportion of farms on which feedlot wastes were exposed to rainfall, often on unpaved lot surfaces, meant that much of the fertility value in the wastes, especially nitrogen, was lost although most farmers collected the wastes and put them on cropland. Seven percent of the farmers either failed to collect wastes or discarded them.

Waste Handling Facilities

Farmers generally were fully equipped to clean their feedlots and apply the wastes to cropland (table 45). Four-fifths of all producers drove tractor-mounted front-end loaders. A fifth of all producers, even those with the smallest feedlots, used expensive self-propelled skid loaders.

Over 90 percent of all producers used tractor-drawn spreaders for putting solid wastes on land. Liquid spreaders, equally divided between machines equipped for soil injection of the wastes and those for surface application, were used by 3 percent of the producers, mostly those with the larger feedlots who used slotted floor confinement housing.

Producers operating open-lot systems made no provision for storing wastes. Farmers maintaining the open-shed and lot system, dominant in feedlots, usually built up wastes and bedding in the shelter area until time for cleaning. A few used paved slabs for stockpiling solid wastes, but none had special protected storage for solid wastes. Little use was made of other special waste storage facilities on these farms. Liquid storage was used on 3 percent of the farms, usually in pits beneath slotted floor buildings. About 1 percent of farmers provided special storage tanks for liquid wastes. Capacity in all types of liquid storage averaged 600 gallons per head of feedlot capacity.

Most of the waste handling equipment in use was relatively large, ranging in capacity from medium size to the largest manufactured. Both the high level of mechanization and relatively large equipment were employed because multiple enterprises kept the livestock portion of the farm business relatively large even when the cattle feeding enterprises were small.

Table 43—Proportion of farms using bedding for cattle on feed and amounts of bedding used, 1980

Feedlot annual sales (head)	All farms		Farms with calf programs[1]		Farms with yearling programs[1]	
	Farms using bedding	Bedding per 100 head	Farms using bedding	Bedding per 100 head	Farms using bedding	Bedding per 100 head
	Percent	*Tons*	*Percent*	*Tons*	*Percent*	*Tons*
20 to 99	73	24	100	30	70	20
100 to 199	64	18	82	18	29	20
200 to 499	69	17	94	12	46	23
500 & over	47	14	81	9	38	16
All sizes	70	19	91	17	54	20

[1]Calf or yearling programs are defined as those where 75 percent or more of the cattle placed on feed in 1980 were either calves or yearlings or older cattle.

Farmers spread investments mainly over the 20 years prior to 1980 for the major machines used in manure handling (app. table 11). About one-third of the machinery was at least 10 to 20 years old; another third was manufactured between 1970 and 1974; and a third was no more than 5 years old.

Pollution Control

Livestock operations, regardless of type or size, must prevent surface runoff pollution from production sites. Farmer cattle feedlots, however, are too small to come within Federal regulations requiring permits and the construction of specific facilities for control of surface runoff except in specified cases (7).

Cattle feeders employed several major measures to control pollution from surface runoff--diversion terraces, lagoons, settling basins, and vegetative filters (app. table 20). The larger feedlots mostly featured diversion terraces, which appeared on only 6 percent of all farms.

Table 44—Proportion of farms handling feedlot wastes in different forms, 1980

Feedlot annual sales (head)	Form of wastes handled on the farm			
	Not handled	Solid form	Liquid form	Both solid & liquid forms
		Percent		
20 to 99	2	98	0	0
100 to 199	17	76	3	4
200 to 499	7	83	7	4
500 & over	4	77	1	19
All sizes	5	92	1	2

Labor Use

Producers recorded an average labor input of 6.1 hours for each head of cattle fed in 1980 (table 46). That amounted to about 1.2 hours of labor for each cwt of gain. Calf programs took an average of 6.3 hours per head, yearling programs 5.8 hours per head.

Labor estimates include all work by the farm labor force for care and feeding of the cattle, feed processing, manure handling, buying and selling of the cattle, and other activities pertaining specifically to the cattle feeding enterprise. The study excludes time spent on the production and harvesting of crops for cattle feed and labor for maintenance of machinery, equipment, and facilities used in the feedlot operation.

Operators with the smallest feedlots put in about four times as much labor per head as those with the largest feedlots because the larger operations employed more mechanization, and fixed time associated with feedlot activities did not change in proportion to size of operation. Mechanization was relatively high, however, even for the smallest feedlots because of the presence of other livestock enterprises. Manual methods of materials handling likely would have doubled labor inputs on small feedlot enterprises. The relationship between size of enterprise and labor inputs was essentially the same for calf and yearling feeding programs as for all feedlots.

Calf feeding programs took an average of 6.3 hours of labor per head, or 1 hour of labor per cwt of gain ranging

Table 45—Proportion of farms using specified kinds of equipment and facilities for handling feedlot wastes, 1980

Kind of equipment on the farm	Annual sales of fed cattle (head)				
	20 to 99	100 to 199	200 to 499	500 & over	All sizes
			Percent		
Front-end loader, tractor	84	66	80	79	80
Skid loader, self-propelled	20	17	30	26	21
Spreader, solid	96	80	88	89	92
Spreader, liquid with soil injectors	0	5	2	8	2
Spreader, liquid for surface application	0	2	8	12	2
Scraper, tractor	31	46	52	24	36
Agitator for liquid	0	3	1	6	1
Pump for liquid	0	6	8	12	2
Storage for solids	1	4	0	3	1
Storage for liquids	0	6	10	14	3

from 1.8 hours per cwt of gain in the smallest feedlots to 0.6 hour in the largest. Yearling feeding programs used less labor per head but slightly more labor per cwt of gain, averaging 1.2 hours per cwt of gain for all feedlots and ranging from 2.4 hours in the smallest to 0.6 hour in the largest. The frequent buying, placing, and marketing of cattle compared with time on feed may have accounted for the slightly higher labor inputs per unit of gain for yearling cattle.

Much of the work done on farmer feedlots is performed by unpaid operator and family labor (table 46). Hired labor averaged only 18 percent on all feedlots. The proportion of hired labor increased with size of the feedlot enterprise, but changes in the labor mix reflected differences in the sizes of farm businesses rather than sizes of cattle feeding enterprises. Annual sales of fed cattle from the largest feedlots were nearly 20 times more than sales from the smallest feedlots, but from all enterprises, farms with the largest feedlots grossed income less than three times as large as farms with the smallest feedlots.

Conclusion

The number of individual farmer cattle feeders is expected to decline during the eighties as commercial feedlot enterprises effectively combine economic strength and marketing strategies to claim a larger share of the market.

Several drawbacks, such as susceptibility to unfavorable price changes, substantial debt, and the high cost of production facilities, all of which may be more easily absorbed by a commercial feedlot, will likely further erode the farmer cattle feeder's comparative economic standing.

Table 46—Amount and source of labor for cattle feeding, by type, 1980[1]

Feedlot annual sales (head)	Labor per head[2]			Source of labor[3]		
	All enterprises	Calf programs	Yearling programs	Operator	Unpaid family	Hired
	Hours			*Percent*		
20 to 99	11.6	11.8	11.5	74	16	10
100 to 199	6.0	6.3	5.7	66	15	19
200 to 499	4.3	4.7	4.1	62	16	22
500 & over	3.0	3.7	2.8	45	17	38
All sizes	6.1	6.3	5.8	66	16	18

[1]Labor includes all time spent on work related to the cattle feeding enterprise including buying and selling of cattle. Time for maintenance of machinery and facilities, and production and harvesting of feed crops is not included.

[2]Approximately two-thirds of all feeder cattle were yearlings or older. Gains per head were about 530 pounds for all cattle combined, 475 pounds for yearlings, and 640 pounds for calves. Calf and yearling programs included farms where 75 percent or more of the cattle placed on feed were of the specified kind.

[3]The distribution of labor among the various sources applies to all cattle feeding enterprises.

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(15) Van Arsdall, Roy N., and others. *Costs and Returns of Producing Livestock in the United States—Final 1980, Preliminary 1981, and Projections for 1982.* Staff Rpt. No. AGES-820201. U.S. Dept. Agr., Econ. Res. Serv. Feb. 1982.

Appendix table 1—Farmer and commercial feedlots, number of feedlots, and sales of fed cattle, 23 States, 1964-81

	Feedlots					Sales						
		Commercial		Farmer			Commercial			Farmer		
Year	Total	Number	Percent of total	Number	Percent of total	Total	Fed cattle	Percent of total	Average per lot	Fed cattle	Percent of total	Average per lot
	Number		*Percent*	*Number*	*Percent*				*1,000 head*			
1964	219,244	1,564	0.7	217,680	99.3	17,366	6,720	38.7	4,297	10,646	61.3	49
1965	215,422	1,689	.8	213,733	99.2	17,926	7,592	42.4	4,495	10,334	57.6	48
1966	208,510	1,822	.9	206,688	99.1	19,534	8,679	44.4	4,763	10,855	55.6	48
1967	201,173	1,883	.9	199,290	99.1	20,942	9,486	45.3	5,038	11,456	54.7	57
1968	195,247	1,919	1.0	193,328	99.0	22,662	10,501	46.3	5,472	12,161	53.7	63
1969	185,527	2,023	1.1	183,504	98.9	23,860	12,393	51.9	6,126	11,467	48.1	62
1970	177,317	2,162	1.2	175,155	98.8	24,884	13,675	55.0	6,325	11,209	45.0	64
1971	165,289	2,205	1.3	163,084	98.7	25,281	14,783	58.5	6,704	10,498	41.5	64
1972	154,514	2,032	1.3	152,482	98.7	26,843	16,588	61.8	8,163	10,255	38.2	67
1973	146,384	2,040	1.4	144,344	98.6	25,298	16,388	64.8	8,033	8,910	35.2	62
1974	140,651	1,954	1.4	138,697	98.6	23,334	15,087	64.7	7,721	8,247	35.3	59
1975	136,696	1,777	1.3	134,919	98.7	20,504	13,258	64.7	7,461	7,246	35.3	54
1976	132,535	1,796	1.4	130,739	98.6	24,170	16,244	67.2	9,045	7,926	32.8	61
1977	131,904	1,886	1.4	130,018	98.6	24,853	16,936	68.1	8,980	7,917	31.9	61
1978	127,425	1,902	1.5	125,523	98.5	26,645	18,103	67.9	9,518	8,542	32.1	68
1979	123,436	2,106	1.7	121,330	98.3	24,600	17,601	71.5	8,358	6,999	28.5	58
1980	113,326	2,144	1.9	111,182	98.1	23,183	16,773	72.4	7,823	6,410	27.6	58
1981	104,409	2,241	2.1	102,168	97.9	23,014	16,862	73.3	7,524	6,152	26.7	60

Source: *(13)*

Appendix table 2—Number of fed cattle sold and number of farms selling fed cattle, by annual sales and State, 1978[1]

Feedlot annual sales[2]	Fed cattle sold in— Illinois	Iowa	Minnesota	Kansas	Nebraska	Total
	1,000 head					*Percent*
Farms selling—						
1 to 9	35.9	24.8	28.4	7.9	10.6	107.6	0.8
10 to 19	58.5	72.4	53.3	13.4	30.2	227.8	1.7
20 to 99	270.8	662.6	221.9	89.4	264.6	1,509.3	11.3
100 to 199	182.2	535.5	145.9	66.8	211.3	1,141.6	8.6
200 to 499	306.7	884.1	201.0	131.5	368.5	1,891.8	14.2
500 to 999	176.1	603.6	110.2	129.1	332.9	1,351.9	10.1
1,000 to 2,499	131.1	467.1	74.0	147.3	347.1	1,166.6	8.7
2,500 & over	61.0	482.8	56.4	3,205.1	2,135.2	5,940.6	44.6
Total	1,222.3	3,732.9	891.1	3,790.5	3,700.4	13,337.2	100.0
	Number					
Farms selling—						
1 to 9	8,153	5,296	6,424	1,982	2,393	24,248	26.0
10 to 19	4,296	5,240	3,977	994	2,167	16,674	17.9
20 to 99	6,556	14,421	5,354	2,050	5,834	34,215	36.7
100 to 199	1,332	3,934	1,105	502	1,559	8,432	9.0
200 to 499	1,046	2,997	695	435	1,228	6,401	6.9
500 to 999	270	911	167	197	492	2,037	2.2
1,000 to 2,499	95	326	52	101	238	812	.9
2,500 & over	15	83	12	131	177	418	.4
Total	21,763	33,208	17,786	6,392	10,088	93,237	100.0

[1]Census estimates for 1978 for these five States exceed SRS estimates for the same year by 719,000 head of fed cattle and 15,958 farms. See *Cattle: Final Estimates for 1976-79*, ESS, Stat. Bul. No. 655, USDA, pp. 42-43. SRS estimates pose a more rigorous definition of fed cattle and are considered to be more appropriate for purposes of this study.

[2]Census structures enterprise size according to annual sales; SRS uses lot capacity. Part of the sales in the 1,000 to 2,499 census sales class came from feedlots of less than 1,000-head capacity, which are classified as farmer feedlots in this study.

Source: *(14)*

Appendix table 3—Size of cattle feeding enterprises in 1980 compared with size of enterprises in 1975

Feedlot annual sales (head)	Average percent of sales[2]	Fed cattle sales range per farm in 1980 compared with 1975 sales[1]: Same size (76 to 125 percent)	Larger size (126 to 200 percent)	Much larger size (over 200 percent)	Smaller size (50 to 75 percent)	Much smaller size (less than 50 percent)
			Percent			
20 to 99	58	60	10	4	11	15
100 to 199	106	34	11	23	16	17
200 to 499	116	43	17	20	6	14
500 & over	150	27	35	32	0	6
All sizes	98	52	12	11	11	14

[1]Estimates are based on the 96 percent of the sample farms on which cattle were fed in both 1975 and 1980.

[2]Number of fed cattle sold in 1980 divided by sales in 1975.

Appendix table 4—Amount of land farmed and number of cattle fed in 1980 compared with 1975

Feedlot annual sales (head)	Change in land farmed and range per farm in 1980 compared with 1975				
	Same land (76 to 125 percent)	More land (126 to 200 percent)	Much more land (over 200 percent)	Less land (50 to 75 percent)	Much less land (less than 50 percent
	Percent				
20 to 99	95	232	84	60	–
100 to 199	128	225	260	–	56
200 to 499	158	130	–	100	–
500 & over	207	301	100	98	214
All sizes	117	222	135	63	74

– = No farms in this category.

Appendix table 5—Amount of land farmed in 1980 compared with land farmed in 1975

Feedlot annual sales (head)	Land farmed range per farm in 1980 compared with 1975					
	Percent of acres farmed (all farms)[1]	Same land (76 to 125 percent	More land (126 to 200 percent	Much more land (over 200 percent	Less land (50 to 75 percent	Much less land (less than 50 percent
		Percent				
20 to 99	111	54	23	4	19	0
100 to 199	124	57	28	8	0	7
200 to 499	112	73	21	0	6	0
500 & over	117	66	26	2	2	4
All sizes	114	57	24	4	14	1

[1]Acres of land farmed in 1980 divided by acres farmed in 1975.

Appendix table 6—Proportion of farms with livestock enterprises other than cattle feeding in 1975 and 1980

Feedlot annual sales (head)	Kind of livestock enterprise[1]																	
	None			Beef cows			Hogs			Dairy			Sheep			Poultry		
	1975	1980	Both	1975	1980	Both	1975	1980	Both	1975	1980	Both	1975	1980	Both	1975	1980	Both
									Percent									
20 to 99	5	11	5	71	57	57	62	51	50	24	24	24	9	9	9	3	3	3
100 to 199	16	16	15	28	23	23	77	76	76	6	3	3	6	6	6	6	3	3
200 to 499	40	39	37	26	26	26	43	51	42	8	2	2	2	6	2	4	4	4
500 & over	40	48	40	18	16	11	49	45	45	2	2	0	3	3	3	2	2	2
All sizes	12	17	12	56	46	46	61	55	53	8	6	6	4	6	4	3	3	3

[1]All farmers had cattle feeding enterprises in 1980, but 4 percent distributed over the four size classes did not feed cattle in 1975.

Appendix table 7—Proportion of farms adding or dropping specified livestock enterprises between 1975 and 1980

Feedlot annual sales (head)	Kind of livestock enterprise									
	Beef cows		Hogs		Dairy		Sheep		Poultry	
	Add	Drop	Add	Drop	Add	Drop	Add	Drop	Add	Drop
	Percent									
20 to 99	0	14	1	12	0	0	0	0	0	0
100 to 199	0	5	1	2	0	2	0	0	0	7
200 to 499	0	0	9	2	0	4	4	0	0	0
500 & over	4	7	0	4	1	1	0	0	0	0
All sizes	*	10	2	8	*	1	1	0	0	1

*Less than 0.5 percent.

Appendix table 8—Changes in the size of livestock enterprises other than cattle feeding in 1980 compared with 1975

Feedlot annual sales (head)	Kind of livestock enterprise[1]														
	Beef cows			Hogs			Dairy			Sheep			Poultry		
	Larger	Smaller	Same	Larger	Smaller	Same	Larger	Smaller	Same	Larger	Smaller	Same	Larger	Smaller	Same
	Percent														
20 to 99	58	5	36	36	19	45	95	0	5	13	0	87	0	0	100
100 to 199	40	38	22	28	30	42	0	0	100	44	0	56	0	100	0
200 to 499	54	25	20	35	38	27	100	0	0	100	0	0	31	0	69
500 & over	56	42	1	22	26	52	0	0	0	74	26	0	0	0	100
All sizes	56	10	34	34	24	43	94	0	6	23	*	77	2	7	91

*Less than 0.5 percent.
[1]Includes only farms having the specified enterprises both in 1975 and 1980.

Appendix table 9—Distribution of farms according to sex and age of feeder cattle purchased, 1980

Feedlot annual sales (head)	Sex and age of cattle								
	All steer calves	All yearling steers	Mixed age steers	All heifer calves	All yearling heifers	Mixed age heifers	Mixed sex calves	Mixed sex yearling	Mixed sex and age
	Percent								
20 to 99	10.5	42.9	11.4	3.5	1.2	0	18.4	9.3	3.1
100 to 199	20.3	31.9	0	6.5	4.1	3.5	18.3	0	15.4
200 to 499	4.8	34.1	6.9	7.0	7.4	2.7	15.4	2.9	18.8
500 & over	3.2	23.3	18.9	3.0	12.3	2.7	3.6	19.7	13.3
All sizes	11.4	36.6	8.0	4.8	4.1	1.7	16.6	6.3	10.5

Appendix table 10—Proportion of farmers using selected markets for selling fed cattle, 1980

Feedlot annual sales (head)	Type of market						
	Auction only	Terminal only	Direct only	Commission firm only	Auction, direct only	Terminal & direct only	All other
	Percent						
20 to 99	14	54	19	2	0	5	6
100 to 199	13	20	19	36	7	0	5
200 to 499	2	29	42	4	1	20	2
500 & over	0	6	64	8	5	10	7
All sizes	11	43	24	9	2	6	5

Appendix table 11—Proportion of major items of feed and manure handling machinery manufactured in various periods[1]

Type of equipment	Percent of machines manufactured during—				
	Period before 1960	1960-69	1970-74	1975-79	1980
	Percent				
Feed processing[2]	6	38	24	27	5
Hay processing[3]	0	0	0	58	42
Mobile feed delivery[4]	16	20	34	29	1
Mechanical bunk feeder[5]	2	40	20	35	3
Hay handling[6]	0	5	7	87	1
Upright silo unloader[7]	17	37	24	21	1
Solid manure equipment[8]	7	26	34	29	4
Liquid manure equipment[9]	0	34	18	44	4

[1]Machines are given equal weight without regard to size or values in determining the age distribution. All categories of machines were in widespread use except for hay processing and handling.
[2]Includes all types of portable and stationary feed milling and mixing equipment.
[3]Includes bale shredders and tub grinders.
[4]Includes tractor-drawn, self-unloading wagons and feed trucks used to distribute feed to cattle.
[5]Includes all types of electrically powered equipment for moving feed into bunk feeders.
[6]Includes mechanical stack movers, big bale movers, and big bale unrollers.
[7]Includes both bottom and surface unloaders for upright silos.
[8]Includes tractor-mounted front-end loaders, self-propelled skid loaders, tractor scrapers, and all types of solid manure spreaders.
[9]Includes all types of liquid manure spreaders with and without attachments for soil injection.

Appendix table 12—Proportion of capacity of cattle shelter buildings and feed storage structures for high-moisture grains and silages constructed in various periods, 1980[1]

Type of facility	Percent of capacity during—					
	Period before 1950	1950-59	1960-69	1970-74	1975-79	1980
			Percent			
Open-front shed	23	4	43	9	21	0
Cold confinement barn	12	8	9	31	40	0
Warm confinement barn	40	22	25	8	5	0
Hay storage	42	22	29	*	6	1
Nonairtight upright silo (used for high-moisture grains)	26	5	49	15	5	0
Airtight upright silo (used for high-moisture grains)	0	10	42	14	34	*
Nonairtight upright silo (used for silages)	*	22	48	20	10	0
Airtight upright silo (used for silages)	0	1	81	6	11	1
Horizontal silo	1	5	23	33	35	3

*Less than 0.5 percent.

[1]Airtight and open upright silos can be used interchangeably for storage of high-moisture grains and silages. Construction period data are recorded according to use being made of these silos in 1980. Horizontal silos were being used mostly for storage of silages, but some operators of the larger feedlots used them for storage of ground high-moisture grains. Storage for dry grains is not included.

Appendix table 13—Proportion of floor area in cattle shelter buildings, by type of flooring, type of shelter building, 1980

Type of housing and annual sales of cattle (head)	Percent of floor space—				
	Paved	Slotted over pit	Paved with flush gutter	Paved with covered scrape gutter	Dirt
			Percent		
Open-front shed					
20 to 99	43	0	0	0	57
100 to 199	70	0	0	0	30
200 to 499	86	0	0	0	14
500 & over	85	0	0	0	15
All sizes	64	0	0	0	36
Cold confinement					
20 to 99	100	0	0	0	0
100 to 199	21	53	0	0	26
200 to 499	92	7	0	0	1
500 & over	54	42	4	0	0
All sizes	70	25	2	0	3
Warm confinement					
20 to 99	100	0	0	0	0
100 to 199	100	0	0	0	0
200 to 499	0	96	0	4	0
500 & over	100	0	0	0	0
All sizes	84	15	0	1	0

Appendix table 14—Proportion of farms on which tractors and trucks were used for specified feedlot activities, 1980

Type of machinery and annual sales	Percent of farms that—								
	Haul purchased feed	Process feed	Distribute feed to cattle	Haul water	Clean lots and load manure	Spread manure	Haul feeder cattle	Haul fat cattle	Perform general work
	Percent								
Tractors:									
20 to 99	4	70	73	1	94	96	*	*	28
100 to 199	5	71	89	0	78	83	5	0	48
200 to 499	13	49	79	2	92	91	0	0	33
500 & over	15	63	76	7	95	96	0	1	39
All sizes	6	67	76	1	91	93	1	*	32
Trucks:									
20 to 99	24	N/A	5	6	N/A	0	50	52	77
100 to 199	24	N/A	10	0	N/A	0	57	49	81
200 to 499	35	N/A	1	4	N/A	5	54	45	92
500 & over	48	N/A	19	0	N/A	2	34	33	94
All sizes	26	N/A	6	5	N/A	1	51	50	81

* = Less than 0.5 percent.
N/A = not applicable.

Appendix table 15—Average annual use of tractors for all farm activites by size of tractor, 1980[1]

Feedlot annual sales (head)	Horsepower of tractor									
	Under 50	50 to 64	65 to 79	80 to 94	95 to 109	110 to 124	125 to 154	155 to 199	200 & over	All sizes
	Hours									
20 to 99	269	245	430	411	520	446	348	70	200	359
100 to 199	214	510	509	773	478	461	543	500	*	447
200 to 499	411	417	541	483	623	427	519	358	*	484
500 & over	371	548	551	788	699	627	567	521	500	570
All sizes	279	362	458	501	545	458	471	220	215	406

*None used.
[1]Includes only tractors used in feedlot activities.

Appendix table 16—Proportion of tractors used in cattle feedlot activities, by size of tractor, 1980

Feedlot annual sales (head)	Horsepower of tractor								
	Under 50	50 to 64	65 to 79	80 to 94	95 to 109	110 to 124	125 to 154	155 to 199	200 & over
	Percent								
20 to 99	34.6	8.0	19.6	9.1	12.4	10.7	2.2	1.4	2.0
100 to 199	24.5	12.3	14.9	11.6	17.5	11.0	8.0	.2	0
200 to 499	18.5	16.5	9.0	15.1	15.4	5.3	16.4	3.8	0
500 & over	19.8	10.3	17.3	5.7	22.4	9.7	11.4	2.3	1.1
All sizes	29.5	10.2	17.0	10.2	14.4	9.9	5.9	1.6	1.3

Appendix table 17—Proportion of tractor horsepower hours used for feedlot activities generated by selected fuels, 1980

Feedlot annual sales (head)	Percent of horsepower hours by—		
	Gasoline	Diesel	LP gas
	Percent		
20 to 99	40	59	1
100 to 199	21	79	0
200 to 499	29	69	2
500 & over	15	83	2
All sizes	29	70	1

Appendix table 18—Proportion of farms using trucks of various sizes, 1980

Feedlot annual sales (head)	Size of truck used on farms				
	No truck	1 ton or less	1.1 to 2 tons	2 to 5 tons	Over 5 tons
	Percent				
20 to 99	6	87	36	6	0
100 to 199	15	83	22	4	0
200 to 499	5	86	17	18	10
500 & over	2	80	29	24	8
All sizes	7	86	31	8	2

Appendix table 19—Average annual use of trucks for all farm activities, by size of truck, 1980

Feedlot annual sales (head)	Miles per truck with ton sizes of—			
	Under 1.0	1.0 to 2.0	2.1 to 5.0	Over 5.0
		Miles		
20 to 99	9,412	2,870	8,750	*
100 to 199	6,418	2,885	4,250	*
200 to 499	8,372	3,515	4,862	22,750
500 & over	6,913	3,262	3,312	23,000
All sizes	7,636	3,165	4,304	22,889

*None used.

Appendix table 20—Proportion of farms with specified pollution control facilities and the average size of the facilities per 100 head of feedlot capacity, 1980

	Diversion terrace		Lagoon		Settling basin		Vegetative filter	
	Farms	Average size	Farms	Average size	Farms	Average size	Farms	Average size
	Percent	*Linear ft.*	*Percent*	*Acres*	*Percent*	*Sq. ft.*	*Percent*	*Acres*
20 to 99	7.0	600	0	*	0	*	1.3	8.5
100 to 199	1.4	540	.6	1.1	0	*	0	*
200 to 499	8.1	100	.9	.2	5.5	260	3.1	.8
500 & over	5.8	150	12.4	.4	9.2	870	1.4	.4
All sizes	6.1	320	.8	.4	1.1	600	1.3	2.7

*None used.

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